FOLSOM DAM RAISE PROJECT

DRAFT SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT

July 2016

State Clearinghouse SCH # 2006022091

US Army Corps of Engineers

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

SAFCA Sacramento Area Flood Control Agency

CENTRAL VALLEY FLOOD PROTECTION BOARD PUBLIC SAFETY AND FLOOD MANAGEMENT STATE OF CALIFORNIA

Abstract

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Type of Statement: Draft Supplemental Environmental Impact Statement/Environmental Impact Report (DSEIS/SEIR)

Lead NEPA Agency: U.S. Army Corps of Engineers, Sacramento District (Corps)

Lead CEQA Agency: State of California, Central Valley Flood Protection Board (CVFPB)

Cooperating Agency: U.S. Bureau of Reclamation

Abstract: The Corps and its non-Federal partners, the CVFPB and SAFCA, propose to provide flood risk management and increased flood protection to the Sacramento metropolitan area by constructing a 3.5-foot combination earthen raise and reinforced concrete flood wall for Folsom dams and reservoir dikes while implementing refinements to existing emergency spillway tainter gates. This draft DSEIS/SEIR evaluates the direct, indirect, and cumulative effects on environmental resources from alternative plans and identifies avoidance, minimization, and mitigation measures. The project is not expected to cause substantial loss, degradation or fragmentation of any natural communities or wildlife habitat – most potential adverse effects would be short-term, reduced, or avoided when conducted with best management practices (e.g. air quality, recreation, and noise impacts). The proposed project alternatives are evaluated and include mitigation measures to reduce, minimize, or avoid, where feasible, any significant and potentially significant adverse impacts.

Public Review and Comment: The 45 day public review period would begin on July 19, 2016, and the official closing date for receipt of comments on the draft DSEIS/SEIR would be September 1, 2016. All comments received would be considered and, as appropriate, incorporated into the final SEIS/SEIR. Written comments or questions concerning this document should be directed to the following: U.S. Army Corps of Engineers, Sacramento District; Attn: Ms. Mariah Brumbaugh.

EXECUTIVE SUMMARY

ES.1 PURPOSE OF THE DSEIS/SEIR

This draft Supplemental Environmental Impact Statement/Environmental Impact Report (DSEIS/SEIR) has been prepared by the U.S. Army Corps of Engineers (Corps), Sacramento District, as the Federal Lead Agency under the National Environmental Policy Act (NEPA) and the State of California Central Valley Flood Protection Board (CVFPB) as the State Lead Agency under the California Environmental Quality Act (CEQA), for the Folsom Dam Raise Project. The Folsom Dam Raise proposed action is a cooperative effort between the Corps, the U.S. Bureau of Reclamation (USBR), the Sacramento Area Flood Control Agency (SAFCA), and the CVFPB, through the California Department of Water Resources (DWR).

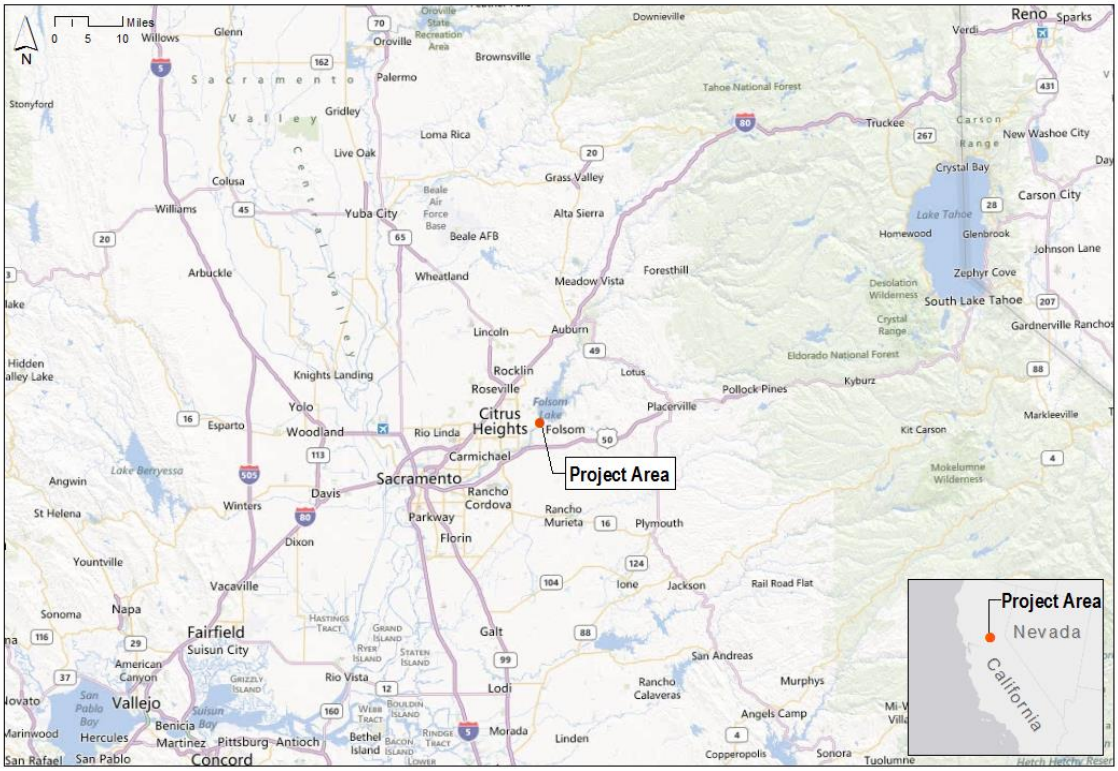
The Folsom Dam Raise Project, along with the Folsom Modifications Project, was reevaluated together in the Post Authorization Change Report (PACR) for the American River Watershed Project dated March 2007. This report resulted in the recommendation of a JFP auxiliary spillway at the Folsom Dam – to be constructed jointly with the USBR – as well as a 3.5-foot combination earthen raise and concrete floodwall construction on the dams and reservoir dikes, refinements to existing emergency and service spillway tainter gates, and three ecosystem restoration projects (design of this phase of the project would begin after construction of the dam raise features). After the authorization of emergency spillway gate work in the 2007 PACR, Reclamation completed structural improvements to the existing service and emergency tainter gates, as well as the spillway piers in 2011. Due to these improvements, emergency gate refinements have been developed in lieu of complete gate replacement – this resulted in the development of an Engineering Documentation Report (EDR) in 2013 to support a variation to the emergency spillway gate replacement concept. In addition, a series of Design Documentation Reports (DDRs) are being developed to determine the designs for increasing the height of Folsom dikes and dams by 3.5 feet – it is anticipated the DDRs for all of the engineering designs would be completed by the end of 2019.

This DSEIS/SEIR examines the impacts of proposed construction of the Spillway Gate Modification (Tainter Gate) and Combination Earthen Raise/Concrete Floodwall. The 3.5-foot raise was not fully designed in the 2007 PACR, nor was a full environmental analysis completed in the associated 2007 Folsom Dam Safety/Flood Damage Reduction DSEIS/SEIR (Folsom DS/FDR/EIS/EIR). Consequently, additional design documentation was determined to be necessary and this Folsom Dam Raise DSEIS/SEIR is being prepared to fully disclose revised project alternatives and updated project-related effects.

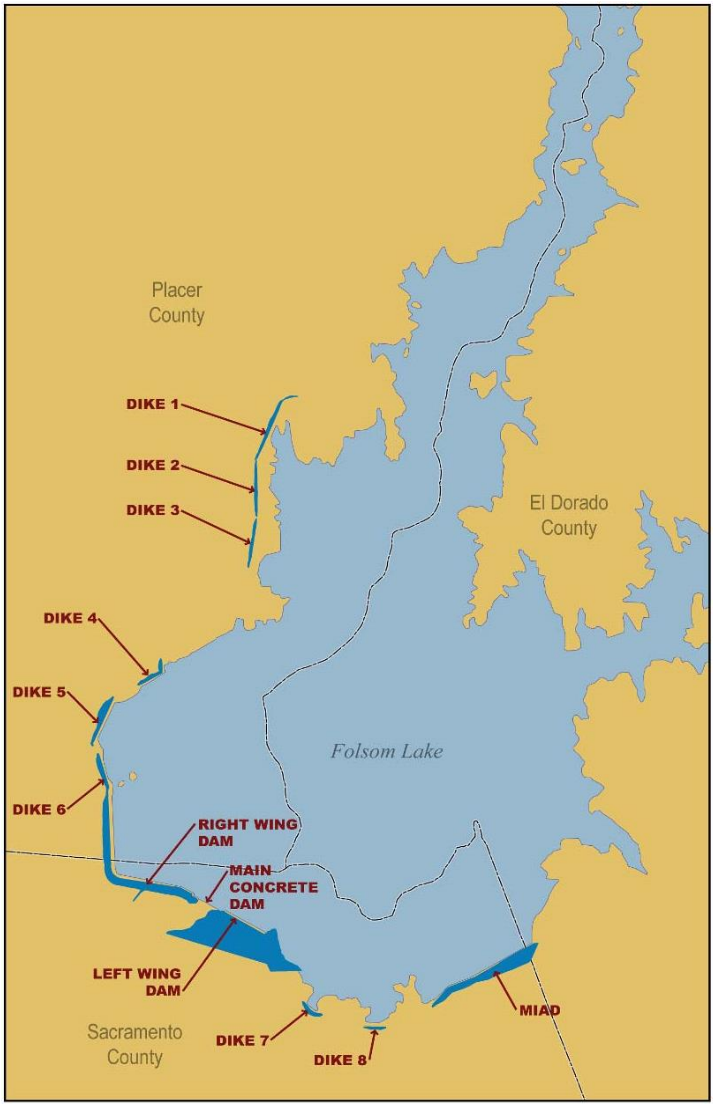
ES.2 PROJECT AREA

The project is located in the area surrounding Folsom Lake that falls within the Counties of Placer, El Dorado, and Sacramento – Folsom Dam and its associated facilities are located 23 miles northeast of the city of Sacramento. The Folsom Dam and Reservoir (Folsom Lake) are located downstream from the north and south forks of the American River. The study area is contained around the Folsom Facility which consists of four dams – the Main Concrete Dam, the Left Wing Dam (LWD), the Right Wing Dam (RWD), and the Mormon Island Auxiliary Dam (MIAD) – as well as eight Dikes (Dikes 1 through 8), and the emergency spillway. Site access to the project area would occur through a Bureau of Reclamation facility on existing paved roads and through the crest of the LWD. Staging areas proposed for the current Bureau of Reclamation (Reclamation) work yard are adjacent to the borders of remaining blue oak woodland.

In this document, the project area consists of the emergency spillway, Dikes 1 through 8 and MIAD, as well as the LWD and RWD (which tie into the main dam). The existing tainter gates on the emergency spillway, Dikes 1 through 8, and MIAD would have a 3.5-foot earthen embankment raise implemented, and the LWD and RWD (which tie into the main dam) would have a 3.5-foot concrete flood wall constructed and reinforced. General construction access to the site would come from Folsom Dam Road via Auburn-Folsom Road. A total of 31 staging areas have been defined within the project area – all the staging areas have been previously disturbed for a total of 157.2 acres. The project area is shown on maps ES.1 and ES.2.



ES.1 – Project Area Map.



ES.2. Folsom Lake and the Location of the Structural Aspects of the Folsom Dam.

ES.3 BACKGROUND AND NEED FOR ACTION

Currently, ongoing construction work, such as the Folsom Dam Modification Project Approach Channel, and updates to the Folsom Water Control Manual (WCM) may allow Folsom Dam to safely pass the PMF without further improvements, including the Folsom Dam Raise and Emergency Spillway Gate Modifications. However, affixing top seal bulkheads over the emergency gates would allow higher flood pools across the spillway, adding flood damage reduction benefits while still safely passing the PMF without overtopping the tainter gates. Raising the dam by 3.5 feet would allow for longer holding discharges by creating additional surcharge space (temporary water storage space utilized during rare flooding events) within the reservoir. Structural modifications associated with the Folsom Dam Raise Project are proposed to provide increased flood damage protection by increasing the flood storage capacity and/or pool release mechanisms at the Folsom Facility.

Sacramento is identified as one of the most at-risk communities in the nation for flooding, resulting in a need to reduce this risk through numerous flood damage reduction measures. The existing system leaves the highly urbanized Sacramento area at an unacceptably high level of flood risk. The Sacramento metropolitan area has a high probability of flooding due to its location at the confluence of (and within the floodplain of) two major rivers. Both of these rivers have large watersheds with very high potential runoff which has overwhelmed the existing flood management system in the past. The existing levee system was designed and built many years ago, before modern construction methods were employed. These levees were constructed close to the river to increase velocities which would flush out hydraulic mining debris. This debris is essentially gone now, and the high velocities associated with flood flows are eroding the levees, which are critical components of the flood management system needed to reduce flood risk.

Historic flood events in 1986 and 1997 raised concerns over the adequacy of the existing flood risk management system; these concerns prompted a series of investigations regarding the need to provide additional protection to the Sacramento metropolitan area. The results of these investigations led to the authorization of several flood risk management projects in the American River watershed, including the Folsom Dam Raise Project.

National Environmental Policy Act (NEPA) evaluation is required when a major Federal action is under construction and may have significant impacts on natural and human environmental quality. The Corps has determined that the proposed project may have significant effects on the environment; therefore, an EIS is required. This draft DSEIS/SEIR provides supplemental documentation and evaluates the potential direct, indirect, and cumulative environmental effects of alternative plans for the Folsom Dam Raise. This draft DSEIS/SEIR also identifies mitigation measures to avoid, minimize, and compensate for impacts.

ES.4 ALTERNATIVES

The Folsom Dam Raise Project plan formulation process was developed and discussed in Chapter 4.0 of the 2002 Long Term Study, Plan Formulation and Screening of the Flood Damage Reduction Measures, in Chapter 5.0, Flood Control Alternatives, and in Chapter 6.0, Ecosystem Restoration for Flood Plain and Fisheries Resources.

Potential design alternatives were identified for assessment of engineering, environmental, and cost considerations. The two alternatives discussed in this DSEIS/SEIR are the final array of alternatives considered – the other alternatives were screened out for reasons described in the table below.

Table ES.1 Measures and Alternatives Considered but Eliminated.

Alternative	Reason for Elimination
Reduce the Stop Log Fabrication and Installation from Two Sets to Zero New Sets; Utilize Existing Set	Two gates would need to be non-operational during the construction, which Bureau of Reclamation does not agree with that action.
Tainter Gate Refinement: Replacement of Emergency Tainter Gates	Alternative 2 was chosen based on achieving the same benefit as this alternative but with more flexibility in operations for less cost.
Refined Emergency Gate Replacement	Alternative 2 was chosen based on achieving the same benefit as this alternative but with more flexibility in operations for less cost.
Tainter Gate Refinement: Horizontal Top Seal	The geometry and location of the Horizontal Top Seal made this refinement option more complex and difficult to design.
Tainter Gate Refinement: Skin Plate Extension	Modifications necessary for this alternative were deemed excessive and, more significantly, transverse seal loading is not recommended or practiced in tainter gate designs.
Dredging	Dredging would be expensive, and environmentally and culturally damaging process. Because of its very high cost, this measure was not considered further.
The 3.5-Foot Dam Raise: Concrete Floodwall	This alternative was not carried forward because of the potential recreation and environmental effects based on feedback from the public and environmental team.
The 3.5-Foot Dam Raise: Earthen Raise	It was rejected for the left and right wing dams due to space constraints associated with steeper embankment slopes compared to other reservoir dikes.
The 3.5-Foot Dam Raise: Concrete Masonry Unit (CMU)	This alternative was rejected because reinforced CMU tend to crack more readily during earthquakes and other heavy movements.
3.5-Foot Dam Raise: Mechanically-Stabilized Earthen (MSE) Cap	The primary concern is that the stress-strain differential between the anchors and soil material would cause a seepage path through the MSE wall.

ES.4.1 Alternative 1 – No Action

Under Alternative 1, the Corps would not implement the emergency spillway gate modifications or the 3.5-foot combination earthen raise and floodwall construction. Under the

No Action Alternative, significant loss of life is expected with a great enough flood event or PMF, as well as injuries, illnesses, and the release of hazardous and toxic contaminants to the downstream floodplain. The urban areas downstream of Folsom Dam would continue to be at risk of flooding, and lives would continue to be threatened. The gates and dam would be at risk for failure, threatening the levee system downstream with a surge of flow beyond the current 160,000 cfs levee capacity. If a dam or gate failure were to occur, the chance of levee failure downstream would increase. If a levee failure were to occur, major government facilities and transportation corridors would be impacted until flood waters recede. A temporary shut down or slowing of State and Local government functions would occur, and workers would be unable to perform their duties until the buildings are restored and can once again be occupied.

ES.4.2 Alternative 2 – Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall (environmentally preferred plan)

The 3.5-foot dam raise alternative is currently at a lesser level of general development and analysis than the Spillway Modification (tainter gates). It is likely that supplemental design and environmental documentation would be required for the dam raise prior to construction. Any post-construction operational changes would be defined in a WCM update and accompanying environmental documentation.

While there will be no changes in normal operations with the construction of the dam raise, the raise would result in an ablity to sustain an increased flow of 160,000 cfs for a longer period of time, and would have possible inundations up to 486.34' (NAVD88). The WCM update, based on the Folsom Joint Federal Project, is scheduled to be completed in October 2017; any new operations that the project would have as a result of the Dam Raise would be dependent upon the updated WCM. As it stands, the proposed 3.5-foot raise is only an increase in the surcharge zone, not the operational space, and would only have an effect in the events that encroach in that surcharge zone.

The 2013 Engineering Documentation Report (EDR) identified refinements to the existing tainter gates in lieu of the complete gate replacement originally proposed in the 2007 PACR. Refinements include additional strengthening features to the existing tainter gates and a new "top seal" bulkhead that would prevent overtopping of the spillway gates during a major flood event. This alternative includes the following modifications:

- A hydraulic structure (the top seal bulkhead) would be mounted above the spillway tainter gates in order to prevent overtopping during a major flood event.

- Additional retrofit elements (skin plate ribs, lower girder, and trunnion anchorage) on the tainter gates are necessary to address and account for the loading conditions imposed by the PMF.

- A vertical concrete extension to the top of the pier would provide the necessary elevated platform for the new hoist system. The top seal bulkheads would mount to and seal against the pier extension. This concrete extension would also serve as the water barrier between top seal bulkheads when the reservoir reaches elevations above 478.59’ NAVD88.

- Modifications to the existing steel “pier wrap” installed by Reclamation are specified to handle additional loads resulting from a PMF scenario. These modifications include extensions to the height and width of the existing steel “wrap” as well as additional anchoring requirements.

- A 3.5-foot raise to the heights of Dikes 1 through 8 and MIAD with an earthen embankment raise, using an engineered fill material similar to the existing composition of the earthen dikes, would allow seepage and pore pressure to be maintained through the interface between the old and the new material.

- A reinforced 3.5-foot concrete flood wall would be constructed on the LWD and the RWD that would tie into the main dam, the new control structure, and the existing terrain. A reinforced concrete retaining wall (parapet wall) with footing embedded in the earth-fill of the embankment would be constructed along the embankment crest to the required height.

ES.5 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

Significant resources that may be affected by the alternatives include existing vegetation and wildlife resources. Under Alternative 1, the proposed construction would not occur. No construction related effects to vegetation and wildlife would occur, and the conditions in the project area would remain consistent with existing conditions.

Alternative 2 is proposed to have a construction footprint of up to 50 feet on both sides of Dikes 1 through 8 and MIAD, with vegetation removal and ground-surface disturbance in staging areas; disturbance caused by staging and stock pile construction activity, noise, traffic, and night lighting are expected to displace wildlife species through multiple years of construction from year 2017 to 2020. Disturbance from the project is expected to intermittently compromise water access to the shoreline for a period of five years. The duration of construction related disturbances would be overlapping and continuous throughout Dikes 1 through 8. However, displacement would be considered temporary in nature and would have a less than significant impact on wildlife populations with the implementation on mitigation, minimization, and avoidance measures.

Annual grassland constitutes a substantially higher acreage within the project area. To avoid significant impact to grassland habitat, mitigation measures would be employed. The project area would be returned to pre-existing condition (to the extent practicable) after project completion, and then improved with the use of native flora. Staging areas and other disturbed soil surfaces would be re-vegetated with native grass species directly after construction activities cease.

The emergency tainter gate improvements would result in a localized construction footprint for three years. Construction noise and traffic are expected to disturb and/or displace local wildlife that utilize oak and pine woodlands, as well as grasslands, over the project duration.

Construction staging areas are proposed primarily for disturbed areas that appear to have formerly supported oak woodland vegetation but now consist of bare soil or ruderal vegetation. Up to two acres of oak woodland savannah is included in staging area boundaries within the tainter gate project area. Though small in acreage, loss of these trees would contribute disproportionately to the reduction of oak woodland habitat in the project area. Mitigation measures for protecting existing trees would reduce these impacts to less-than-significant.

A wetland delination was conducted on 10 June 2014 (Appendix D). Additional delineation would be conducted at MIAD to determine wetland status or drainage characteristics which require protection. Any delineated wetlands in the project area would be fenced and signed for protection from construction activity. Alternative 2 would have no dredge or fill material below the ordinary high water mark of the reservoir, and is not expected to affect open or other waters of the U.S. as defined by Section 404 of the CWA.

Construction associated with raising embankment dams and dikes could temporarily disturb nesting birds in the project area. Certain species of migratory and resident birds have commonly nested on structures and construction equipment on the Folsom Dam Modification Project and are expected to continue this behavior on structures and equipment in Alternative 2. Pre-emptive measures would be conducted by a qualified biologist to prevent birds from nesting on construction equipment and the structures undergoing modification. Environmental protection training would occur for all construction personnel regarding avian nests and environmental protection.

The valley elderberry longhorn beetle (VELB) may be effected by incidental damage to elderberry shrubs caused by construction personnel or equipment. Impacts may also occur if elderberry shrubs need to be transplanted due to their location in areas that cannot be avoided by construction activities—this could cause direct mortality of beetles and/or disruption of their life cycle. Indirect effects from haul trucks driving in close proximity to elderberry shrubs and the resultant vibration and dust could disturb the beetle. Long-term effects of the project may include reduced viability of elderberry shrubs due to the placement of project area materials. Temporal loss of habitat or species abundance may also occur due to transplantation of elderberry shrubs. These direct and indirect effects would be considered potentially significant if they cause adverse effects on elderberry shrubs and/or cause mortality or stress to VELB residing in the shrubs. However, with the implementation of mitigation measures from the USFWS "Conservation Guidelines for the Valley Elderberry Longhorn Beetle," July 1999, in combination with transplanting of shrubs, mitigation plantings, and the creation of habitat, these impacts are not likely to adversely affect the valley elderberry longhorn beetle.

For the Folsom Dam Raise Project, the entire construction footprint of Dikes 1 through 8, the LWD, RWD, and MIAD, along with the Emergency Spillway, were analyzed under the CAA to determine the worst case scenario for air quality impacts. The analysis conducted determined that the emissions associated with construction of this action would be above the *de minimis* level – emission reductions were incorporated into the project analysis. Even with implementation of mitigation measures, emissions would not be reduced below the USEPA's general conformity *de minimis* threshold. Compliance with the CAA would be accomplished with the completion of a General Conformity Analysis, or with the inclusion in the State Implementation Plan.

Overall, Alternative 2 is not expected to cause substantial loss, degradation, or fragmentation of any natural communities or wildlife habitat when conducted with the specified mitigations, and is expected to have a less-than-significant effect. The project area would be returned to the pre-existing condition to the extent practicable at the completion of this project. The implementation of Alternative 2 is not expected to conflict with local policies or ordinances protecting biological resources because Sacramento County tree and USFWS recommended habitat protections and prescriptions would be observed. There are no applicable Habitat Conservation Plans (HCPs) or National Community Conservation Plans (NCCPs) in the project area. The implementation of Alternative 2 is not expected to conflict with any other approved local, regional, or state habitat conservation plan.

While there will be no changes in normal operations with the construction of the dam raise, the raise would result in an ablity to sustain an increased flow of 160,000 cfs for a longer period of time, and would have possible inundations up to 486.34' (NAVD88). Any new operations that the project would have as a result of the construction of the Dam Raise would be dependent upon the updated WCM. As it stands, the proposed 3.5-foot raise is only an increase in the surcharge zone, not the operational space, and would only have an effect in the events that encroach in that surcharge zone.

ES.6 COMPLIANCE WITH APPLICABLE LAWS, POLICIES, AND PLANS

This document would be adopted as a joint draft DSEIS/SEIR, and would fully comply with the National Environmental Policy Act and California Environmental Quality Act requirements. The project would comply with all Federal environmental laws and regulations, as well as all state, regional, and local laws, regulations, and ordinances. In addition, the non-Federal sponsor would comply with all State and local laws and permit requirements.

ES.7 PUBLIC INVOLVEMENT

Two public scoping meetings for the Folsom Dam Raise Project were held on Wednesday, February 19, 2014 at the Folsom Community Center and on Monday, February 24, 2014 at the Sacramento Library Galleria. Mail and e-mail announcements were also sent to stakeholders and other interested parties. In addition, a Notice of Intent was filed with the Federal Register on February 6, 2014.

ES.8 ISSUES OF KNOWN CONTROVERSY

Some significant and controversial issues have been raised by agencies and the public relating to the construction of the 3.5-foot dam raise, spillway modifications, and related features. These issues are based on feedback gathered in preliminary studies from formal and informal agency meetings, workshops, public meetings, telephone discourse, letters, and emails.

- Preliminary air quality emission calculations indicate that all active construction alternatives of the project would result in air emissions that could lead to violations of applicable State ambient air quality standards and would not comply with the Federal Clean Air Act (CAA). Concurrent construction activity within the Folsom Lake region would contribute additional emissions that could cumulatively fail to meet the general conformity rule of the CAA.

- Construction is expected to increase noise levels, affecting local recreationists and adjacent residents, even under circumstances of compliance with the City of Folsom noise ordinances.

- Degradation of public recreational experiences in and adjacent to the project – noise, visual aesthetics, and access would be compromised during construction from 2017 to 2020.

- Two homeowners and their homeowner's association want the Dike 7 Office Complex area fully restored as part of the proposed project, as described in the March 2016 Phase V SEA/EIR. Their concerns focus on the future conversion of a portion of this area to a public trailhead. Conversion to a trailhead is not included in the proposed project. Regardless of whether the area is restored, establishing a trailhead here would be a State Parks project beyond the control of the Corps since the Corps does not own the Dike 7 Office Complex property that is part of the Folsom Lake State Recreation Area.

ES.9 UNRESOLVED ISSUES

There are no unresolved environmental issues at this time.

ES.10 PREFERRED PLAN

Alternative 2, Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall, has been identified as the preferred plan. This alternative would include additional strengthening features to the existing spillway tainter gates with a new "top seal" bulkhead that would prevent overtopping of the spillway gates, a 3.5-foot earthen raise on the dikes and dam, as well as construction of a reinforced 3.5-foot concrete flood wall. Alternative 1 was not selected because it was not considered to be in the best interest of public safety – it did not provide for increased flood protection or allow for an increase in Folsom Dam safety measures. Alternative 2 is expected to provide continuous flood-risk management benefits to the Sacramento metropolitan area and provide flood damage reduction while safely passing the PMF flow without overtopping the spillway gates.

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ACRONYMS & ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APE	Area of Potential Effects
ARB	California Air Resources Board
BA	Biological Assessment
BMPs	Best Management Practices
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CCAO	Central California Area Office
CCTS	Central California Taxonomic System
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CMU	Concrete Masonry Unit
CNDDB	California Natural Diversity Database
Corps	U.S. Army Corps of Engineers
CSUS	California State University, Sacramento
CVFPB	State of California Central Valley Flood Protection Board
CVP	Central Valley Project
CWA	Clean Water Act
DDR	Design Documentation Reports
DPM	Diesel Particulate Matter
DPR	California Department of Parks and Recreation
DSEIS/SEIR	Draft Supplemental Environmental Impact Statement/Environmental Impact Report
DWR	California Department of Water Resources
EDR	Engineering Documentation Report
ESTG	Emergency Spillway Tainter Gates
EWDAA	Energy and Water Development Appropriations Act
FHWA	Federal Highway Administration
FLSRA	Folsom Lake State Recreation Area
GHG	Greenhouse Gas
GIS	Geographic Information System
HAP	Hazardous Air Pollutant
HCM	Highway Capacity Manual
HCP	Habitat Conservation Plans
HTRW	Hazardous, Toxic, and Radioactive Waste
ITE	Institute of Transportation Engineers
JFP	Joint Federal Project
kV	kilovolt
kW	kilowatts

LOS	Level of Service
LWD	Left Wing Dam
MBTA	Migratory Bird Treaty Act
MIAD	Mormon Island Auxiliary Dam
MPO	Metropolitan Planning Organization
MSE	Mechanically-Stabilized Earthen
NAAQS	National Ambient Air Quality Standards
NCCP	National Community Conservation Plans
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Naturally Occurring Asbestos
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
PACR	Post Authorization Change Report
PG&E	Pacific Gas and Electric Company
PMF	Probable Maximum Flood
ROD	Record of Decision
ROG	Reactive Organic Gases
RWD	Right Wing Dam
RWQCB	Central Valley Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
SIP	State Implementation Plans
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Metropolitan Utility District
SPCP	Spill Preventions and Countermeasure Plan
SVAB	Sacramento Valley Air Basin
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Toxic Air Contaminants
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
USBR	Bureau of Reclamation
USEPA	U. S. Environmental Protection Agency
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VELB	Valley Elderberry Longhorn Beetle
WAPA	Western Area Power Administration
WCM	Water Control Manual

CHAPTER 1.0 - INTRODUCTION

This document is a joint draft supplemental environmental impact statement/environmental impact report (DSEIS/SEIR) prepared by the U.S. Army Corps of Engineers (Corps), Sacramento District as the Federal Lead Agency under the National Environmental Policy Act (NEPA) and the State of California Central Valley Flood Protection Board (CVFPB) as the State Lead Agency under the California Environmental Quality act (CEQA). The Sacramento Area Flood Control Agency (SAFCA) is the local sponsor.

This DSEIS/SEIR is a supplement to the 2007 Final EIS/EIR for the Folsom Dam Safety and Flood Damage Reduction Project (FEIS/EIR) prepared by the U.S. Bureau of Reclamation. This DSEIS/SEIR has been prepared to evaluate the potential environmental impacts of the alternatives proposed in the Folsom Dam Raise Project. This document evaluates project alternatives and includes mitigation measures to reduce, minimize, or avoid, where feasible, any significant and potentially significant adverse impacts.

1.1 Authorization

There are several authorizations that have led to this supplemental DSEIS/SEIR. They include:

- Section 209 of the Flood Control Act of 1962 (Pub. L. No. 87-875, § 209, 76 Stat. 1180, 1196-98 (1962)), authorizes studies for flood control in northern California. This is the basic authority for the Corps to study water resource related issues for the American and Sacramento Rivers.

- 1996 Water Resources Development Act (WRDA) (Pub. L. No. 104-303, § 101(a)(1), 110 Stat. 3658, 3662-3663 (1996)): Congress authorizes levee improvement features common to all three plans in the *1996 American River Watershed Project, California, Supplemental Information Report* (1996 SIR). The 1996 SIR described multiple alternative plans, of which certain levee and other flood system improvements were "common" to all alternatives: “Common Features.”

- 1999 WRDA, Section 101(a) (6) (Pub. L. 106-53, § 101, 113 Stat. 274 (1999)) authorizes the Folsom Modification Project (modified river outlets), as identified in the 1996 SIR.

- 2004 Energy and Water Development Appropriations Act (EWDAA), Section 128 ((Pub. L. No. 108-137, § 128, 117 Stat. 1838, (2003)) authorizes a 7-foot raise of Folsom Dam (including replacement of 8 spillway tainter gates), based on the recommendations contained in the November 2002 Chief of Engineers Report in the Corp's 2002 Long Term Study Final Supplemental Plan Formulation Report.

- 2006 EWDAA, Section 128, (Pub. L. No. 109-103, §128, 119 Stat. 2259-2260 (2006)) The Secretary of the Army and the Secretary of the Interior are directed to collaborate on authorized activities to maximize flood damage reduction improvements and address dam safety needs at Folsom Dam and Reservoir, California. The Secretaries shall expedite technical reviews for flood damage reduction and dam safety improvements. In developing improvements under this section, the Secretaries shall consider reasonable modifications to existing authorized activities. The Secretaries are authorized to expend funds for coordinated technical reviews, joint planning, and preliminary design activities.

- WRDA 2007, Section 3029 (b) (Pub. L. No. 110-114, §3029, 121 Stat. 1112 (2007)): Based on recommendations from the 2007 Post Authorization Change Report (PACR), the Folsom Dam Raise and Folsom Modification Projects were revised to include the Joint Federal Project (JFP) auxiliary spillway. It is a 3.5-foot dam raise, including reservoir dikes, replacing 3 emergency spillway tainter gates, and 3 ecosystem restoration projects.

1.2 Project Location and Study Area

The project is located in the area surrounding Folsom Lake that falls within Placer, El Dorado, and Sacramento Counties (Figure 1). The Folsom Dam and Reservoir ("Folsom Lake") are located downstream from the confluence of the north and south forks of the American River. The area mainly consists of Federally-owned lands that are leased to and managed by the California Department of Parks and Recreation (DPR). The study area is contained around Folsom Lake, at Dikes 1 through 8, the Left Wing Dam (LWD), Right Wing Dam (RWD), Mormon Island Auxiliary Dam (MIAD), and at the main dam and spillway (Appendix A).

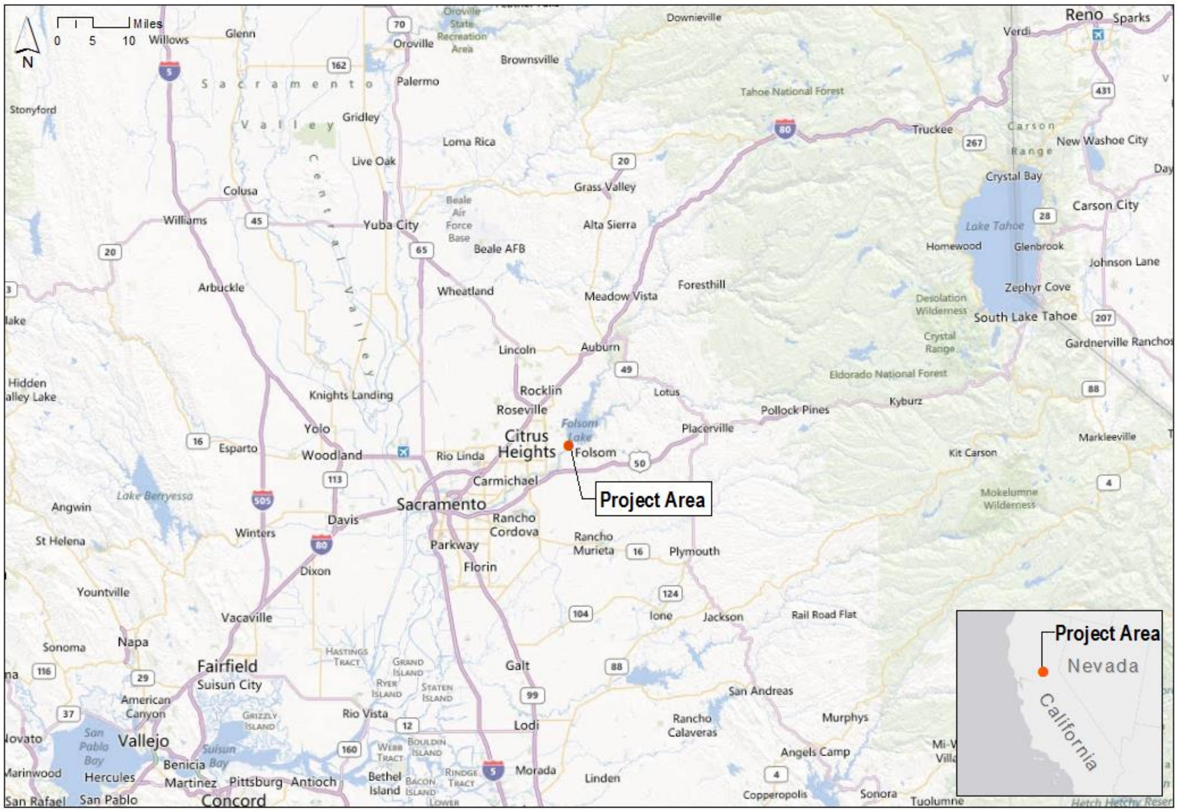

Figure 1. Project Area Map.

1.3 Background

Folsom Dam and Reservoir is located on the main stem of the American River approximately 29 miles upstream from the City of Sacramento. It is a multipurpose dam owned and operated by the Bureau of Reclamation (Reclamation) as part of the Central Valley Project (CVP). The Corps prescribes storage requirements for flood risk management purposes at the dam. Folsom Lake is a multiuse facility authorized for flood risk management, fish & wildlife, water quality, water supply, hydroelectricity, recreation, and navigation. However, it is primarily operated to maximize flood risk management and water supply benefits.

The Folsom Dam and Appurtenant Facilities consists of four (4) dams (Main Concrete Dam, MIAD, RWD, LWD), and 8 dikes (Dikes 1-8), which impound flows on the American River, forming Folsom Lake (Figure 2). Folsom Lake has a capacity of 977,000 acre-feet with a surface area of 11,450 acres. The maximum sustained flood control release that can currently be safely conveyed by the downstream channel is 115,000 cubic feet per second (cfs), however, the proposed project is being designed with the assumption that, with the construction of the American River Watershed Common Features GRR, the downstream levees have been improved to safely convey as much as 160,000 cfs.

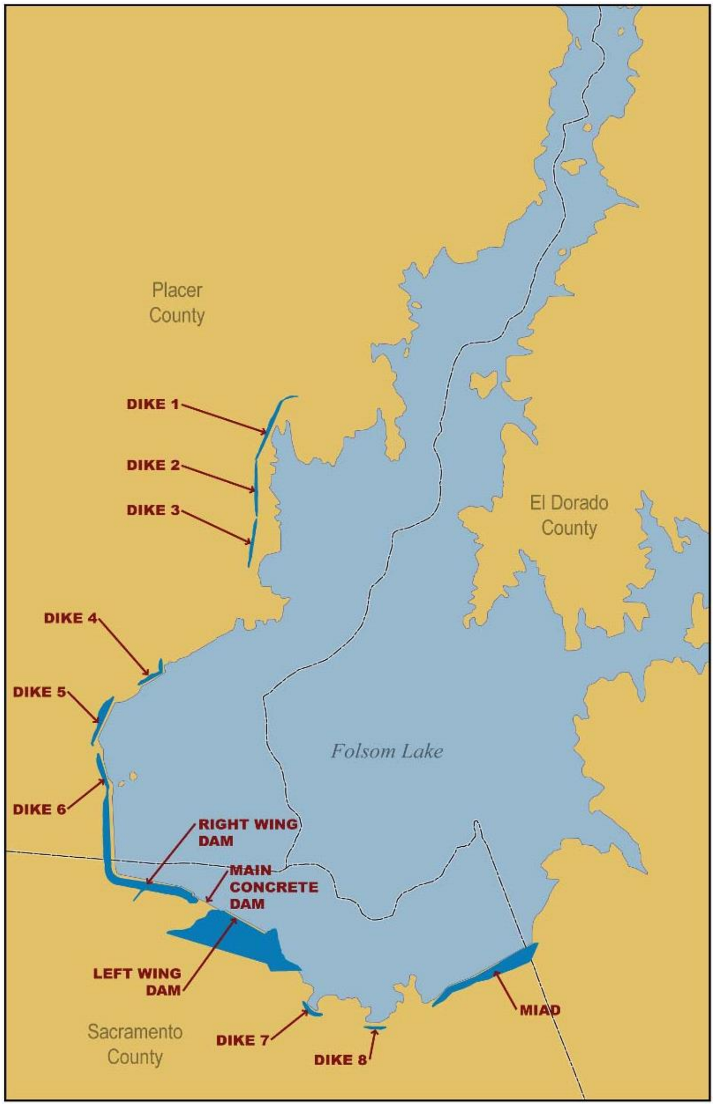

Figure 2. Folsom Lake and the Location of the Structural Aspects of the Folsom Dam.

Folsom Dam was originally authorized in 1944 for flood control, but was reauthorized in 1949 as a multi-purpose facility. The Corps constructed Folsom Dam and transferred it to the U.S. Bureau of Reclamation (USBR) for coordinated operation as an integral part of the Central Valley Project (CVP). Construction of the dam began in October 1948 and was completed in May 1956. Water was first stored in February 1955. In the Energy and Water Development Appropriations Act (EWDAA) of 2004, Congress authorized a plan to raise Folsom Dam; the Folsom Dam Raise Project, including raising Folsom Dam by 7 feet, modifies the spillway, constructs a bridge downstream from Folsom Dam, and modifies the emergency release operations to permit surcharge. This would provide flood benefits while also resolving certain dam safety issues associated with passing the probable maximum flood (PMF). The Folsom Dam Raise project and the Folsom Modifications Project were reevaluated together in the PACR for the American River Watershed Project, dated March 2007. This report resulted in the recommendation of a JFP auxiliary spillway at Folsom Dam (to be constructed jointly with USBR), a 3.5-foot dam raise (including emergency spillway gates, the reservoir dikes, and three ecosystem restoration projects). This automates/reconfigures the temperature control shutters at Folsom Dam and restores the Bushy and Woodlake sites downstream. Under the original authorized plan, the main concrete dam, the RWD and LWD, MIAD, and Dikes 1 through 8 would be raised 7 feet, adding approximately 93,000 acre-feet of flood storage capacity to the reservoir. In addition, the five main dam service tainter gates and the three main dam emergency tainter gates would be replaced.

Since the work authorization of emergency spillway gates in the 2007 PACR, Reclamation has completed structural improvements to the existing service and emergency tainter gates, as well as the spillway piers in 2011. In light of these improvements, emergency gate refinements have been developed in lieu of complete gate replacements. As a result, in 2013, an Engineering Documentation Report (EDR) was developed to support a variation to the emergency spillway gate replacement concept.

Additionally, a series of Design Documentation Reports (DDRs) are being developed to determine the designs for increasing the height of Folsom dikes and dams by 3.5 feet. It is anticipated the DDRs for all of the engineering designs would be completed by 2018. The 3.5-foot raise was not fully designed in the 2007 PACR, nor was a full environmental analysis completed in the associated 2007 Folsom Dam Safety/Flood Damage Reduction EIS/EIR (Folsom DS/FDR EIS/EIR). Therefore, additional design documentation was determined to be necessary and this supplemental Dam Raise EIS/EIR is being prepared to fully disclose revised project alternatives and updated project-related effects.

The primary objectives of the Folsom Dam Raise Project are (1) flood risk management, (2) ecosystem restoration, and (3) construction of a permanent bridge downstream of Folsom Dam, which was completed in 2009. The Dam Raise project has been prioritized with the first phase on the main dam tainter gates portion of the 3.5-foot raise. The beginning of construction is estimated to be concurrent with the Joint Federal Project, which includes construction of an auxiliary spillway consisting of an approach channel, a six tainter gate control structure, and a chute and stilling basin scheduled to be completed in 2017. Design on the remaining phases (ecosystem restoration) would begin after construction of the dam raise features. If necessary, a supplemental NEPA/CEQA document would be prepared for the ecosystem restoration.

1.4 Project Purpose and Need for Action

Purpose

The purpose of the Folsom Dam Raise project is to provide flood risk management benefits to the Sacramento area. The authorized top of flood pool would remain at reservoir water surface elevation 468.34 feet NAVD 88. Affixing top seal bulkheads over the emergency gates would allow higher flood pools across the spillway, adding flood damage reduction benefits while still safely passing the PMF without overtopping the tainter gates. With added operational flexibility and enhanced management of the enlarged flood storage capacity (in the form of surcharge), flood damage benefits are realized with delayed operation for the emergency gates and prolonged outflows at or below the 160,000 cfs threshold for more infrequent events up to a 1/240 year event (the authorized objective).

There would be no changes in normal operations with the construction of the dam raise; however, the raise would result in an ablity to sustain an increased flow of 160,000 cfs for an extended period (as defined by the Emergency Spillway Release Diagram in the Water Control Manual), and could have possible inundations up to 486.34' (NAVD88). The dam raise project could eventually offer increased operational flexibility given the greater surcharge zone and ability to delay operation for the emergency gates and prolonged outflows at or below the 160,000 cfs threshold; however any new operations that might occur as a result of the Dam Raise would be dependent upon the updated WCM, as based on the Folsom JFP.

The 2006 EWDAA authorized activities to maximize flood damage reduction improvements and address dam safety needs at Folsom Dam. At this time, ongoing construction work, such as the Folsom Dam Modification Project Approach Channel, and updates to the Folsom WCM may allow Folsom Dam to safely pass the PMF without further improvements, including the Folsom Dam Raise and Emergency Spillway Gate Modifications. An economic update would be conducted to confirm the flood risk management benefits of the Dam Raise and related construction activities. As the WCM update is finalized, it would be determined whether additional dam safety measures are required to pass the PMF that could be addressed by the Dam Raise component.

Need

Sacramento is identified as one of the most at-risk communities in the nation for flooding. Therefore, there is a need to reduce this risk through numerous flood damage reduction measures. The existing system leaves the highly urbanized Sacramento area at an unacceptably high level of flood risk.

The initial need for increased flood protection in Sacramento was realized when major storms in northern California in 1986, and again in 1997, caused record flood flows in the American River watershed. Outflows from Folsom Dam, together with high flows in the Sacramento River, caused the river stages to exceed the designed safety margin of levees protecting the City of Sacramento. If these storms had lasted much longer, major sections of the levee would likely have failed, causing probable loss of human life and billions of dollars in damages.

The effects of the 1986 and 1997 storms raised concerns over the adequacy of the existing flood risk management system. This led to a series of investigations on the need to provide additional protection for the Sacramento metropolitan area. The results of these investigations led to authorization of several flood risk management projects in the American River watershed, including the Folsom Dam Raise Project.

With the construction of the Joint Federal Project, the current storage capacity of the reservoir does allow for passing the PMF. However, the current crest elevation of the reservoir dikes and embankment dams would not provide sufficient freeboard to meet design criteria for resisting wave height and wave runup[1]. A large enough flood event could cause the current dikes and/or embankment dams to sustain enough damage as to cause failure or overtop.

1.5 Purpose of the DSEIS/SEIR

Construction of the Folsom Dam Raise Project is considered to be a major Federal and State project subject to compliance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), respectively. Because the proposed action has the potential to significantly affect the quality of the human environment, the Corps and the Central Valley Flood Protection Board (CVFPB) through the California Department of Water Resources (DWR) have prepared this joint Draft Supplemental Environmental Impact Statement/Supplemental Environmental Impact Report (DSEIS/SEIR) to satisfy the environmental evaluation and review requirements of these two laws.

This DSEIS/SEIR (1) describes the development and features of the alternatives; (2 discusses the environmental resources in the local and regional project areas; (3) evaluates the direct, indirect, and cumulative effects and significance of the alternatives on these resources; and (4) proposes best management practices and mitigation measures to avoid or reduce any effects to less than significant, when possible. The type and extent of any effects that cannot be reduced to less than significant are identified so that decision-makers can consider the trade-offs of implementing the proposed action.

[1] Wave runup is the maximum vertical extent of wave uprush on a beach or structure above the still water level.

1.5.1 National Environmental Policy Act

NEPA provides an interdisciplinary framework for Federal agencies to develop information that would help them to take environmental factors into account in their decision-making (42 U.S.C. § 4321 *et seq*. and 40 C.F.R. § 1500.1 *et seq.*) To comply with NEPA, an EIS is required whenever a proposed major Federal action may result in significant effects on the quality of the natural and human environment (42 U.S.C. § 4332[2] [C]; 40 C.F.R. § 1508.18[a]). Additionally, in accordance with 40 C.F.R. § 1502.9[i] [ii], the Federal agency shall prepare a supplemental to either draft or final EIS documents when relevant, substantial changes in the proposed action occur or significant new circumstances or information relevant to environmental concerns are realized.

1.5.2 California Environmental Quality Act

According to the State CEQA Guidelines (14 CCR Section 15064[f] [1]), preparation of an EIR is required whenever a project may result in a significant environmental impact. An EIR is an information document used to inform public agency decision makers and the general public of the significant environmental effects of a project; identify possible ways to mitigate, reduce, or avoid the significant effects; and describe a range of reasonable alternatives to the project that can feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. Public agencies are required to consider the information presented in the EIR when determining whether to approve a project. The Corps and the CVFPB intend to use this DSEIS/SEIR in their decision making (per 15124(d)(1)(A).

CEQA requires that state and local government agencies consider the environmental effects of projects of which they have discretionary authority before taking action on those projects (California Public Resources Code [PRC] Section 21000 et seq.) CEQA also requires that each public agency avoid or reduce to less-than-significant levels, whenever feasible, the significant environmental effects of the project it approves or implements. If a project would result in significant environmental impacts that cannot be feasibly mitigated to less-than-significant levels, the project can still be approved but the lead agency's decision makers must issue a "statement of overriding considerations" explaining, in writing, the specific economic, social, and/or other considerations that they believe, based upon substantial evidence, make significant and unavoidable effects acceptable.

Permits and approvals required to implement to project can be found in Chapter 5.0 of this document, a long with consultation requirements required by federal, state, or local laws, regulations or policies.

1.6 Related Documents and Resources Relied on in Preparation of the DSEIS/SEIR

In 2002, the Corps, along with the CVFPB and SAFCA, completed the American River Watershed Long-Term Study Final Supplemental Plan Formulation Report EIS/EIR (LTS EIS/EIR), which analyzed the environmental impacts of a 7-foot dam raise. There was no Record of Decision (ROD) for this analysis. In 2007, the Folsom Dam Raise was reevaluated in the PACR and the associated Folsom Dam Safety/Flood Damage ReductionEIS/EIR, which recommended the replacement of the three emergency spillway gates and a 3.5-foot raise, as well as various other Folsom projects.

Although the environmental analysis of the Folsom Dam Raise is generally covered in the Folsom DS/FDR EIS/EIR, it is not fully designed and a complete environmental analysis was not completed. Additionally, the project was not covered by the 2007 ROD. The PACR states "It is important to note that the effects associated with the authorized Corps projects (Folsom Modification and Folsom Dam Raise projects) are the impacts identified in the original environmental documents for those projects, and impacts are not updated to a current assessment." Therefore, the majority of the Dam Raise analysis in the Folsom Dam Safety/Flood Damage Reduction EIS/EIR is based on the 2002 LTS EIS/EIR and the description, evaluation, and analysis are outdated and incomplete. This supplemental Dam Raise EIS/EIR is being prepared to fully disclose revised project alternatives and updated project-related effects.

1.7 Significant Issues

Significant issues identified as areas of controversy by agencies and the public related to construction of the 3.5-foot dam raise, the spillway gate modifications, and related features are summarized below. These issues were based on preliminary studies and comments from formal and informal agency meetings, workshops, public meetings, telephone discourse, letters, and emails.

- Preliminary air quality emission calculations indicate that all active construction alternatives of the project would result in air emissions that could lead to violations of applicable State ambient air quality standards and would not comply with the Federal Clean Air Act (CAA). Concurrent construction activity within the Folsom Lake region would contribute additional emissions that could cumulatively fail to meet the general conformity rule of the CAA.

- Potential issues were identified with temporary turbidity, mobilization of existing sediment contaminants and reintroduction into the water column, and contaminants from constructions materials.

- Construction is expected to increase noise levels, affecting local recreationists and adjacent residents, even under circumstances of compliance with the City of Folsom noise ordinances.

- Degradation of recreational experience in and adjacent to the project area. Noise, visual aesthetics, and access would be compromised during construction years 2017 to 2020.

1.8 Application of NEPA and CEQA Principles and Terminology

NEPA and CEQA are similar in that both laws require the preparation of an environmental study to evaluate the environmental effects of proposed activities. However, there are several differences between the two regarding terminology, procedures, content of documents, and substantive mandates to protect the environment. NEPA language is primarily used in this document but can be interchanged with CEQA language. In some case in this document, both NEPA and CEQA terminology are used, as in Chapter one where the project purpose, need, and project objectives are discussed.

1.9 Organization of the DSEIS/SEIR

The content and format of this DSEIS/SEIR is designed to meet the requirements of NEPA as set forth by the CEQ and the Corps' NEPA policy and guidance, and by the CEQA and the State CEQA Guidelines. The DSEIS/SEIR is organized as follows:

- The Executive Summary abridges the purpose and intended uses of the DSEIS/SEIR, lead agencies, project location, project background and phasing, need for action, and project purpose/objectives. It presents an overview of the proposed alternatives under consideration, as well as the major conclusions of the environmental analysis while documenting the known areas of controversy and issues to be resolved. It ends with a summary table that lists the environmental impacts, mitigation measures, and significance determination for the alternatives under consideration.

- Chapter 1 explains the NEPA and CEQA processes; lists the lead, cooperating, and responsible agencies that may have discretionary authority over the project, including non-Federal Partners; specifies the underlying project purpose/objectives and need for action that the lead agencies are responding to in considering the proposed project and project alternatives; and outlines the organization of the document; .

- Chapter 2 presents the proposed alternatives under consideration. This chapter constitutes the project description and describes the components for each action alternative as well as the No Action Alternative. This chapter also describes alternatives considered but eliminated from further consideration and provides a summary matrix that compares the environmental consequences of the alternatives under consideration.

- Chapter 3 describes the baseline or existing environmental and regulatory conditions. It provides an analysis of the impacts of each alternative under consideration, and identifies mitigation measures that would avoid/reduce/eliminate significant impacts to less-than-significant levels, where feasible. In addition, compensation is discussed for significant, adverse effects that cannot be reduced to a less than significant level.

- Chapter 4 describes the cumulative impacts of the project when combined with other past, presents, and reasonably foreseeable future projects within the study area. In addition, it analyzes the growth-inducing impacts of the proposed action. The remainder of the chapter includes the requirements of NEPA and CEQA that are not addressed elsewhere in this DSEIS/SEIR such as the relationship between short-term uses of the environment and long-term productivity, significant and unavoidable environmental impacts, and irreversible and irretrievable commitments of resources.

- Chapter 5 summarizes Federal and State laws and regulations that apply to the project and describes the project's compliance with them, and also summarizes required permits, approvals, and authorizations

- Chapter 6 summarizes public involvement activities under NEPA and CEQA; Native American consultation; and coordination with other Federal, state, regional, and local agencies. A list of organizations and individuals receiving a copy and/or notice of this DSEIS/SEIR is also included.

- Chapter 7 lists the various people who were involved in preparing this document.

- Chapter 8 provides a bibliography of sources cited in this DSEIS/SEIR.

- Chapter 9 contains the NEPA-required index for easy reference of topics and issues.

- Appendices contain background information that supports this DSEIS/SEIR.

CHAPTER 2.0 - ALTERNATIVES

2.1 Introduction

The Folsom Dam Raise Project plan formulation process is discussed in Chapter 4.0 of the 2002 Long Term Study, Plan Formulation and Screening of the Flood Damage Reduction Measures, in Chapter 5.0 of the Flood Control Alternatives, and in Chapter 6.0 of the Ecosystem Restoration for Flood Plain and Fisheries Resources.

2.1.1 Alternative Formulation and Screening

American River Watershed Long-Term Study, 2002

The purpose of the Long-Term Study is to address the residual flood risk remaining once the Folsom Modifications project is completed. The Long-Term Study evaluated an array of flood risk management (FRM) alternatives that included dam raises ranging from 3.5 to 12 feet. The study determined that a 7.0-foot raise of Folsom Dam that provided both additional FRM and dam safety[2] would be the most optimal economic solution, exclusive of the Detention Dam alternative.
Congress, through the Energy and Water Development Appropriations Act for Fiscal Year 2004, authorized several project features which were recommended by the Long-Term Study: raising Folsom Dam by 7 feet, modifying the L.L. Anderson Dam spillway, constructing a permanent bridge downstream from Folsom Dam, and modifying the emergency release operations to permit surcharge. At the time, this project was estimated to reduce the risk of flooding to about a 1 in 175 chance.
Two project components of the 2002 Long-Term Study, the 3.5-foot dam raise and the 7.0-foot dam raise, were also evaluated in the 2007 PACR, which is described below.

American River Watershed PAC Report, 2007

The purpose of the 2007 PACR is to document changes to two authorized projects: the Folsom Modifications Project and the Folsom Dam Raise Project. Both projects share an objective of improving flood risk management on the Lower American River, primarily through structural modifications to the existing Folsom Dam. In the PAC report, project elements from both the Folsom Modifications and the Long-Term Study were considered not only for the purpose of flood risk management but also for

[2] Dam safety in this instance refers to enabling the dam facility to pass one-hundred probable percent of the maximum flood, or PMF.

dam safety. During the design refinements for Folsom Modifications, it was believed that due to significant increases in the cost estimates, the authorized project may not be optimal or even economically feasible. During this preliminary analysis, it appeared that adding operational gates to the proposed Bureau of Reclamation dam safety auxiliary spillway would provide a more efficient way to meet two project purposes. The Folsom Dam Joint Federal Project is intended to meet the goals of the Corps of Engineers as well as the Bureau of Reclamation; its analysis became one of the main focuses of the 2007 PACR which evaluated a final array of four action alternatives shown in Table 1 below. Alternative C was the recommended plan and included a six-submerged tainter gate auxiliary spillway, a 3.5-foot dam raise, and three emergency spillway gate replacements.

Table 1. 2007 PACR Final Array of Action Alternatives.

Alternative	Features
A	Eight Main Dam Outlets, Fuse Plug Spillway
B	A Six-Submerged Tainter Gate Auxiliary Spillway
C	A Six-Submerged Tainter Gate Auxiliary Spillway, 3.5' Dam Raise, 3 Emergency and Service Spillway Gate Replacements
D	A Six-Submerged Tainter Gate Auxiliary Spillway, 7' Dam Raise, 8 Emergency and Service Spillway Gate Replacements

Future Without Project Conditions

The future without project condition would be the most likely condition expected to exist in the future without a proposed Federal water resources project. While all the alternatives considered in this EIS/EIR must be compared to existing conditions, the future without project condition constitutes the benchmark against which these alternatives must be compared for Federal planning purposes. Other adopted plans in the planning area and local planning efforts with high potential for implementation or adoption shall be considered as part of the forecasted without project condition.

Under the future without project condition, neither the modifications to the spillway gates nor the 3.5-foot dam raise would be implemented, nor would the associated improved flood risk management benefits occur.

Under the future without project condition, significant loss of life is expected with a great enough flood event, or PMF, as well as injuries, illnesses, and the release of hazardous and toxic contaminants to the downstream floodplain. Post-flood debris clean-up, repairs, and recovery could be a major undertaking. Additionally, infrastructure, such as transportation corridors and power and water supplies, would be incapacitated. The economic impact of the restricted movement of people and goods across the region, the emergency costs associated with evacuation, and all the emergency services associated with such an event, would be huge.

The following general assumptions have been made in regard to the future without project condition for this study:

- In 2017, the Folsom Joint Federal Project (JFP) auxiliary spillway at Folsom Dam would be completed and a new water control manual would be adopted (Folsom Dam Modifications). This includes a 400,000 acre-feet to 600,000 acre-feet (400/600) variable flood space operation that takes incidental storage space in upstream reservoirs into consideration when determining flood storage requirements at Folsom Dam during the flood season. The JFP would allow dam operators to release larger quantities of water at lower reservoir stages and more efficiently utilize flood space in the reservoir. Operation of the JFP is to some degree dependent on the American River levees downstream of the dam being able to safely pass the objective release of 160,000 cfs. At the time of the Folsom PAC report in 2007, assumptions were made based on the available information that the downstream improvements authorized by WRDA 1996 and 1999 would be in place and allow for the safe passage of the objective releases identified in the Folsom PAC report. However, as noted in the Folsom PACR, an erosion study of the downstream channel was needed to provide more information on this subject. Results of this erosion study identified the need for additional erosion protection. Therefore, erosion protection to these levees would enable more optimal operation of the JFP.

- The levee modifications recommended in the 2010 Natomas PAC Report and authorized by WRRDA 2014 (Pub. L. No 113-121) are assumed to be in place, which improve the levees surrounding the Natomas Basin but do not include levee raises to address higher volume, low frequency flows.

- The elements of the American River Common Features project as authorized by WRDA 1996 and WRDA 1999 are assumed to be in place. These features addressed the levee seepage and stability concerns along the American River but do not address the erosion risk.

2.1.2 Measures and Alternatives Considered but Eliminated

Some measures originally identified that could contribute to addressing the Folsom dam raise were reviewed and dropped from further consideration. These measures, which are described in the subsections below, include a skin plate extension, a horizontal top seal in order to refine the tainter gates, an earthen raise of the dam and dikes, dredging to lower the reservoir bottom, a Concrete Masonry Unit (CMU), or a Mechanically-Stabilized Earthen (MSE) cap to raise the dam. Variants of tainter gate refinement and the 3.5-foot dam raise alternative remains the common element between all alternatives and are the primary focus of the remaining alternatives detailed in Sections 2.1.2.1 through 2.1.2.10 below.

2.1.2.1 Reduce the Stop Log Fabrication and Installation from Two Sets to Zero New Sets; Utilize Existing Set

The Folsom Dam tainter gate upgrade includes the fabrication of two new sets of stop logs in order to complete construction within one year, a relatively short construction window. There already exists a set of stop logs which meet the height requirements. However, with the JFP auxiliary spillway expecting completion in 2017, there is a 3 year window for the Folsom Dam tainter gate upgrades to be constructed. The Corps would reduce the quantity of acquired stop log sets to zero and consequently extend the construction period to 3 years. This alternative essentially recommends the re-use of existing stop logs to meet upgrade requirements.

The advantages to this alternative are:

- Reduces risk of trying to complete all work within a one year construction window, the failure of which would result in cost overruns and potential reduction in release capacity during late calendar year conditions of rising pool elevation.

- Shifting costs from additional and unnecessary sets of stop logs to that of an additional two sets of mobilization and demobilization costs.

- Space constraints on the site make completing multiple gates at once difficult, and the proposed design would alleviate this issue by essentially extending the period of performance.

- “Re-using” the existing stop log sets eliminates arguably wasteful spending.

The disadvantages include:

- Loss of flexibility of having two new sets of stop logs.

- Increased mobilization costs.

The justification for this alternative is, although mobilization costs would approximately triple, the reduction in project costs of a single, full set of stop logs is $2,876,309.57 each compared to the complementary increase in mobilization/demobilization project costs of $289,383.91. Incrementally, this proposal decreases end performance by 1/3 (3 sets reduced to 2) for each set of stop logs, and decreases costs by approximately 45%. In terms of incremental performance, the third set of stop logs is not justified without additional inputs or performance requirements that would place a higher value on the third set of stop logs over the first and second ones.

Overall, this alternative was rejected as two gates would need to be non-operational during the raise of the gate hoists, gear assemblies, motors and gantry way. Construction would move more efficiently if more than two gates are taken off line at a time; however, Bureau of Reclamation (USBR) does not see this as an option and requires that no more than two gates be offline at a time. Therefore, as USBR already has one set of stop logs; one additional set of new stop logs would be needed for the project.

2.1.2.2 Tainter Gate Refinement: Replacement of Emergency Tainter Gates

As the current authorized alternative per the 2007 PACR, this alternative would include the complete replacement of the existing three emergency spillway tainter gates (ESTGs) with newly fabricated, larger tainter gates (64.16-ft high, 54.5-ft radius). Trunnions would be elevated and relocated further downstream, requiring vertical and horizontal extension of existing piers, supplemental rock-bolts, and trunnion anchorage requirements, as well as new, elevated mechanical hoisting features and associated pier modifications. This alternative allows for the emergency gates to remain closed until the pool elevation approaches the PMF pool. A 2-foot partial gate opening would provide one foot of freeboard above PMF pool (483.34-ft NAVD 88).

This alternative was not carried forward for analysis, as the Alternative 2 (Section 2.3 below) was chosen based on achieving the same benefit as this alternative but with more flexibility in operations for less cost. Additionally, the horizontal top seal portion of this alternative raised significant concerns on ability to install, and it requires double the amount of steel.

2.1.2.3 Refined Emergency Gate Replacement

This alternative would include the complete replacement of the existing three emergency gates, with newly fabricated, larger tainter gates (58.84-ft high, 48.33-ft radius). This alternative was developed based on hydraulic criteria that have been updated since the 2007 PACR. With the top of gate at elevation 478.34, operational requirements would require the emergency gates to open at a pool elevation of 476.34'. The gate geometry for this concept would not require extensive pier modifications such as those required for the PACR replacement concept.

While maintaining the same gate sill location as the existing tainter gates, the slightly longer gate radius moves the trunnion further downstream but within the footprint of the existing pier geometry. This alternative would provide one foot of freeboard on the gates when the gates are fully open with a PMF pool. This option would also require new mechanical hoisting equipment to be elevated in order to keep motors above PMF elevation.

Similar to the alternative described above (2.1.2.2 Tainter Gate Refinement: Replacement of Emergency Tainter Gates), this was not carried forward for analysis as the Alternative 2 (Section 2.3 below) was chosen based on achieving the same benefit with more flexibility in operations for less cost.

2.1.2.4 Tainter Gate Refinement: Horizontal Top Seal

The Horizontal Top Seal refinement option is characterized by the main bulkhead, which spans horizontally across the emergency spillway bays. With the upper bulkhead and lower bulkhead, the "Horizontal Top Seal" would hold back water when pool elevation exceeds the top of the emergency tainter gate.

The upper bulkhead would be comprised of I-beams while hangers would bear on the spillway bridge parapet and would be welded to the top of the upper bulkhead. The upper bulkhead would also rest on the stop log guide extension. The upper bulkhead would have clearance with the stop log extension, and thus would not restrain cross canyon movement of the piers. The upper bulkheads would seal against the stop log guide extension and the main bulkhead with J-bulb plastic seals. An elliptical skin plate extension would be connected to the bottom of the upper bulkhead to promote better hydraulic flow characteristics. The bolted connection would allow the skin plate extension to be added after both the main bulkhead and the upper bulkhead are in place. The exact shape of the skin plate extension would be determined by physical modeling by hydraulic engineers.

The lower bulkhead would be comprised of seal-welded, wide-flange I-beams. It would span across the spillway bay and be supported on top of the piers. Steel angles anchored on the pier faces would also support this feature. At the pier support, a low friction bearing pad would be installed to allow the lower bulkhead to move freely in the cross canyon direction. The lower bulkhead would have two hoist openings to allow for passage of the gate hoist chains. At each opening, a rubber seal would be installed to minimize leakage.

The horizontal top seal would address the emergency gates' hydraulic deficiency by allowing the gates to remain closed with pool elevation above the top of gate leaf. As for modifications needed to address the structural deficiency, the same gate modification for the Vertical Top Seal design would apply since the existing emergency tainter gates were reused for both design refinements.

This alternative was rejected for several reasons, including:

- With possible controlled leakage through the horizontal top seal bulkhead, the hoist motor may need to be elevated to maintain dry operation.

- The geometry and location of the Horizontal Top Seal made this refinement option more complex and difficult to design. All the bulkheads can be shop fabricated, but their large size can complicate installation.

- The larger main bulkhead in the Horizontal Top Seal concept would likely be more difficult to install than the vertical bulkhead of the Vertical Top Seal concept. The Horizontal Top Seal refinement would have the same constructability challenge at the downstream pier nose due to limited work space.

2.1.2.5 Tainter Gate Refinement: Skin Plate Extension

This concept considered extending the skin plate to a height that met the new freeboard elevation. To accomplish this, the skin plate would have to extend on a tangent path approximately 24-feet long. This would require at least one additional rib support girder, an additional gate strut arm, and a completely redesigned/replaced trunnion assembly.

The heightened skin plate and added members would increase the gate weight, requiring larger hoists. Further, tainter gate side seals typically seal against an embedded seal plate, in which the seal rubs along the arc of the gate as it is opened. The tangent section would not follow this arc and introduce transverse friction loads which side seals would not easily resist. The excessive wear induced on seals from transverse friction would also increase maintenance requirements. Pier modifications would likely be necessary to add extensive side seal plate embedment. These modifications were deemed excessive and, more significantly, transverse seal loading is not recommended or practiced in tainter gate designs.

2.1.2.6 Dredging

Dredging as a viable solution was initially analyzed and screened out in the LTS

EIS/EIR. The geology of Folsom Reservoir is rocky hills with a very thin (3-4 foot) soil veneer. The only major quantities of removable soil are found in the American River streambed, which is underwater most of the time. Thus, the removal would require soil and rock dredging which is expensive, and an environmentally and culturally damaging process. Because of its very high cost, this measure was not considered further and would not be considered in the current EIS/EIR. The environmental effect of disposal is also very high due to potential mercury content and would further increase the cost.

2.1.2.7 The 3.5-Foot Dam Raise: Concrete Floodwall

The 3.5-foot dam raise alternative would consist of a cast-in-place, reinforced concrete wall located near the reservoir side of the crest of each of the dikes, the left and right wing dams, and MIAD. The existing access ramps crossing the dikes would be raised 3.5 feet to match the new concrete crest wall height. The 2007 PACR, with supporting engineering documentation report (EDR), authorized this alternative to raise these features by means of a concrete "crest-wall" (otherwise referred to as floodwall or parapet wall). This floodwall would be installed on the lakeside edge of the crest.

This alternative was not carried forward because of the potential recreation and environmental effects based on feedback from the public and environmental team. Additionally, the main engineering rationale supporting the embankment design was the geotechnical preference for similar and consistent materials. The concrete wall has more susceptibility to seepage paths at concrete-soil interfaces.

2.1.2.8 The 3.5-Foot Dam Raise: Earthen Raise

This concept would raise all of the dams and dikes 3.5 feet through placement of fill derived from the auxiliary spillway excavation and/or from other borrow sources. It was rejected for the left and right wing dams due to space constraints associated with steeper embankment slopes compared to other reservoir dikes. There is inadequate space, particularly at the wing dam toes, at which an earthen fill would widen and conflict with existing project features and access.

2.1.2.9 The 3.5-Foot Dam Raise: Concrete Masonry Unit (CMU)

This alternative was rejected because reinforced CMU tend to crack more readily during earthquakes and other heavy movements. Additionally, CMU is not as effective at preventing water from seeping through and entering the landside. Reinforced concrete walls and/or an earthen raise in general would last longer than reinforced a CMU wall.

2.1.2.10 3.5-Foot Dam Raise: Mechanically-Stabilized Earthen (MSE) Cap

This alternative was not deemed feasible for several reasons. The primary concern is that the stress-strain differential between the anchors and soil material would cause a seepage path through the MSE wall. Further, the use of MSE for such a small height is not common and may further pose constructability challenges on the steep sloped, wing dam embankments. Another concern with the MSE concept is the vertical drop off on both upstream and downstream sides, which creates a safety risk or else requires additional guardrail features. Vertical alignment transitions would also be challenging at each end of the wing dams due to footprint limitations. The transitions would likely need a partial, water-stopped concrete flood wall tie-in to the MSE.

2.2 Alternative 1: No Action Alternative

A No Action Alternative is required pursuant to NEPA, and a No Project Alternative is required for CEQA (for consistency, in this DSEIS/SEIR, it is referred to as the No Action Alternative). The No Action Alternative constitutes the future without project conditions that would reasonably be expected in the absence of the proposed action and serves as the environmental baseline, per NEPA, against which the effects and benefits of the action alternatives are evaluated. The environmental baseline for CEQA is assumed to be the existing conditions.

Under the No Action Alternative, the Federal government would not implement the emergency spillway gate modifications or the 3.5-foot raise, and the associated improved flood risk management benefits would not occur, as also described in the Future Without Project Conditions. Since no other projects are currently planned that are similar or equivalent to the emergency spillway gate modifications or the 3.5-foot raise, it would be speculative to assume that any work would occur absent the Corps project.

Under the No Action Alternative, significant loss of life is expected with a great enough flood event or PMF, as well as injuries, illnesses, and the release of hazardous and toxic contaminants to the downstream floodplain. The urban areas downstream of Folsom Dam would continue to be at risk of flooding, and lives would continue to be threatened. The gates and dam would be at risk for failure, threatening the levee system downstream with a surge of flow beyond the current 160,000 cfs levee capacity. If a dam or gate failure were to occur, the chance of levee failure downstream would increase. If a levee failure were to occur, major government facilities and transportation corridors would be impacted until flood waters recede. A temporary shut down or slowing of State and Local government functions would occur, and workers would be unable to perform their duties until the buildings are restored and can once again be occupied.

2.3 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

Proposed construction elements for Alternative 2 are discussed below in detail, beginning with the design elements of the tainter gates, followed by the design elements of the 3.5-foot dam raise. While modification to all 8 gates (3 ESTGs and 5 service spillway tainter gates (SSTG) are analyzed in this document, the modification of the gates would be phased. Currently, the top seal would only be constructed on the emergency gates, while the modifications to the service spillway tainter gates would occur at a later date.

The 3.5-foot dam raise is currently at a lesser level of general design development and analysis than the Spillway Modification (tainter gates). Because of this, the descriptions of the dam raise alternatives would be briefer than the descriptions of the tainter gate alternatives. It is likely that supplemental design and environmental documentation would be required for the dam raise prior to construction.

Operation and Maintenance requirements of the proposed alternatives would not initially change with Alternative 2. However, the raise would result in an ablity to sustain an increased flow of 160,000 cfs for a longer period of time, and would have possible inundations up to 486.34’ (NAVD88). Any post-construction operational changes would be defined in a Water Control Manual update and accompanying environmental documentation.

2.3.1 Tainter Gate Design Elements

The 2013 Engineering Documentation Report (EDR) identified refinements to the existing tainter gates in lieu of the complete gate replacement originally proposed in the 2007 PACR. Refinements include additional strengthening features to the existing tainter gates and a new “top seal” bulkhead that would prevent overtopping of the spillway gates during a major flood event. Design elements of the tainter gates include:

- **Top Seal Bulkhead:** The top seal bulkhead is a hydraulic structure that would be mounted above the spillway tainter gates in order to prevent overtopping during a major flood event.

- **Tainter Gate Retrofit:** Reclamation’s seismic retrofit of the tainter gates did not account for some of the loading conditions imposed by Probable Maximum Flood (PMF) design load case. As such, some additional retrofit elements are necessary to address this (skin plate ribs, lower girder, and trunnion anchorage).

- **Pier Height Extension:** A vertical concrete extension to the top of the pier would provide the necessary elevated platform for the new hoist system. The top seal bulkheads for the emergency spillway tainter gates would mount to and seal against the pier extension. When the gates are in the closed position, the concrete extension would also serve as the water barrier between top seal bulkheads when the reservoir reaches elevations above 468.34' NAVD88.

- **New Hoist System:** A new hoist system would be installed to handle increased hydrostatic PMF loads, as well as slightly heavier gates from additional retrofit requirements. The new hoist system would also incorporate a new cable.

In light of the Bureau of Reclamation's structural improvements to the tainter gates in 2011, this option would make use of these existing strengthened gates and incorporates a "top seal" feature that increases the height in which the emergency spillway bays can hold back a flood pool before requiring gate opening (EL. 483.34'). This alternative would provide top seals on all 8 gates (3 ESTGs and 5 service spillway tainter gates (SSTG). It would include bulkhead elements that are mounted vertically above the existing tainter gates and span between the emergency spillway piers.

The emergency gate top seal bulkhead would extend from the top of the emergency tainter gate at the closed position, to elevation 486.34 (NAVD 88), while the service gate top seal bulkhead would extend from the top of the service gate at the closed position, to elevation 486.34. This is the elevation of the PMF pool at elevation 483.34, with an additional 3 feet of freeboard.

The top seal bulkhead consists of welded, built-up plate sections. There is a skin plate on the upstream face, and downstream there would be welded, built-up T-sections consisting of a web and flange plate which span continuously across the spillway bays. Between every T-section along the elevation, there would be an intermediate web plate that is half the depth of the T-section and welded continuously along the span of the skin plate. The purpose of this configuration is to create an open cell structure and to reduce weight by removing the flange plate on alternating built-up sections. The top seal bulkheads would be supported by, and bear on, parallel steel angles which would be attached to each pier face with 1- ¼" epoxy anchors and shear lugs in the existing pier concrete, and with 1-¼" F1554 cast-in-place anchors in the new pier concrete. The anchors and shear lugs are designed to transfer the hydrostatic and dead loads to the piers. The dead weight would be supported by a built-up plate section which is welded to the top seal bulkhead, and bears on cantilevered wide flanges that are anchored to each face of the pier. The top seal bulkhead would not be restrained in the cross canyon direction, and therefore would not restrain pier movement during normal loading or seismic conditions. It would be sealed along the top of the tainter gate using a J-Bulb rubber seal with a 3/8" gap. This is to ensure that during normal gate operations, the top seal would not contact the tainter gate skin plate. During high pool elevations, the top seal should be flexible enough to bend toward the skin plate and seal the gate along the top edge.

The upstream spillway bridge parapet wall would provide three feet of freeboard consistent with the rest of the dikes and JFP Auxiliary Spillway. Due to increased hydrostatic load on the emergency gates, some additional retrofits are required to further strengthen the three emergency gates, including the replacement of gate arms, thickened skin plate girder flanges, and skin plate knee braces.

2.3.2 Earthen Raise Design Elements

The increased storage capacity associated with the Folsom Dam Raise project would allow an elevated probable maximum flood (PMF). As such, the current crest elevation of the reservoir dikes and embankment dams would not provide sufficient freeboard to meet design criteria for resisting wave height and runup. Accordingly, increasing the height of all reservoir dikes and embankment dams would be required.

The 3.5-foot dam raise alternative would raise the height of Dikes 1 through 8, and MIAD, with an earthen embankment raise using an engineered fill material similar to the existing composition of the earthen dikes. This would allow seepage and pore pressure to be maintained through the interface between the old and new material. The slopes of the dikes and crest widths would conform to the Corps' standards while maintaining Reclamation's requirements for security and maintenance. The existing riprap and underlying filter layers would be stripped off the upstream side of the dikes, as well as the existing dike top asphalt road and underlying base course, prior to placing the fill to raise the dike. The riprap would be reprocessed for use on the raised dike. The dike raise would have 1V:2.25H sideslopes and a varied width (*e.*g. 22 to 26-foot wide) crest width to allow for construction of the new dike tip road. Figure 3 is an example cross section.

Beyond any USBR modification, the remainder of the dike raise would straddle the existing dike in order to maintain alignment with the raise over the USBR modifications. For this portion of the raise, the protection layers would be stripped off both the upstream and downstream sides of the dike.

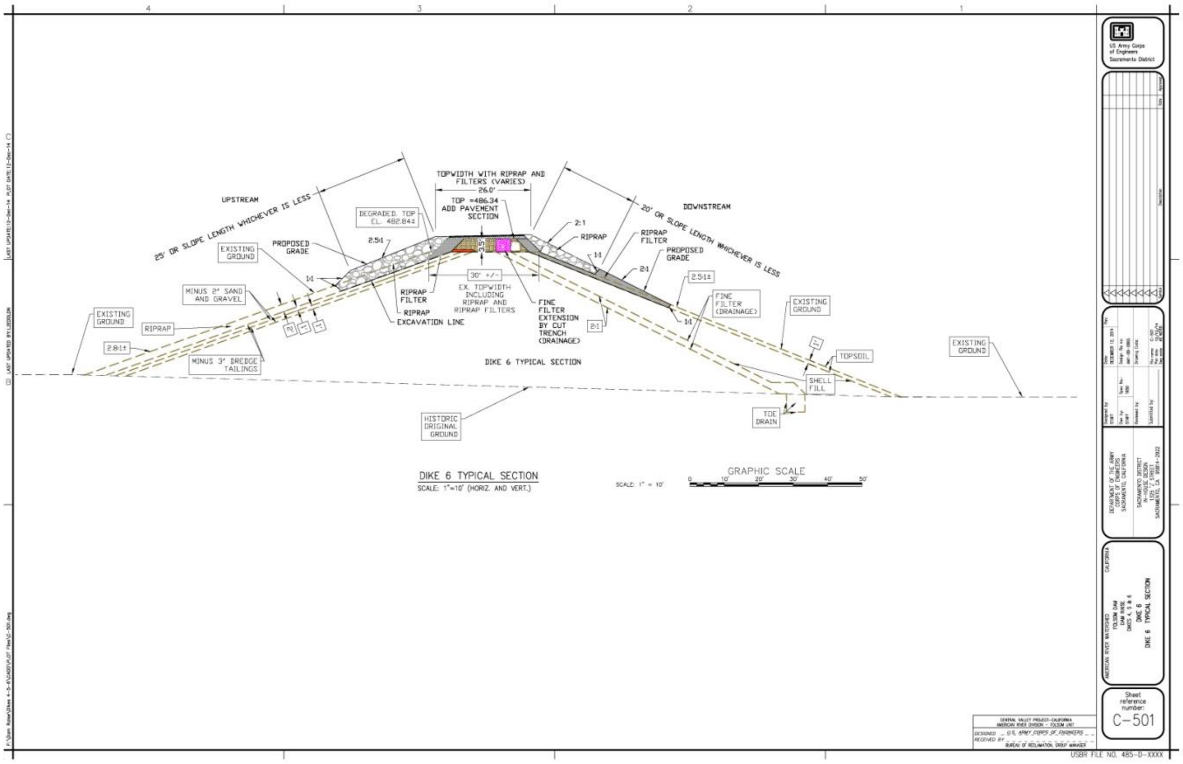

Figure 3. Example Cross Section of A 3.5-foot Earthen Dike Raise.

2.3.3 Concrete Floodwall Design Elements

In combination with the earthen dam raises on the dikes and MIAD, the Corps would also construct a reinforced 3.5-foot concrete flood wall on the LWD and RWD that would tie into the main dam, the new control structure, and the existing terrain (Figure 4). A reinforced concrete retaining wall (also termed a parapet wall), with footing embedded in the earthfill of the embankment, would be constructed along the embankment crest to the required height. This would require excavating a portion of the dam or dike crest to place the footing and to replace the embankment fill along with a drainage element to control pore pressures.

The analysis and design of the flood wall on the left wing dam and the right wing dam would be in accordance with EM 1110-2-2100, EM 1110-2-2104 and EM 1110-2-2502. The flood wall would be constructed using cast-in-place reinforced concrete. The reinforced concrete design and detailing would be in accordance with EM 1110-2- 2100, EM 1110-2-2104 and ACI 318-11. The floodwall would be designed with joints at every 30 feet. A construction joint type J would be provided in the base slab, and expansion joints would be provided in the wall. Seepage through the wall would be controlled by providing a Type “Y” water stop in the stem. Joint filler thickness would be determined from the estimated contraction and expansion from maximum temperature variation.

At the LWD and RWD, filter zones would be required only in the upper portion of the dams. Processed material filter zones would be constructed from the crest to an elevation of approximately 20 to 40-ft below the dam crest. This filter zone would be constructed by excavating a 20 to 40-ft portion of the downstream shell and placing the filter material against the core. The filter zone would then be covered by a layer of excavated shell material. This filter zone would exit into the downstream shell material of the embankment.

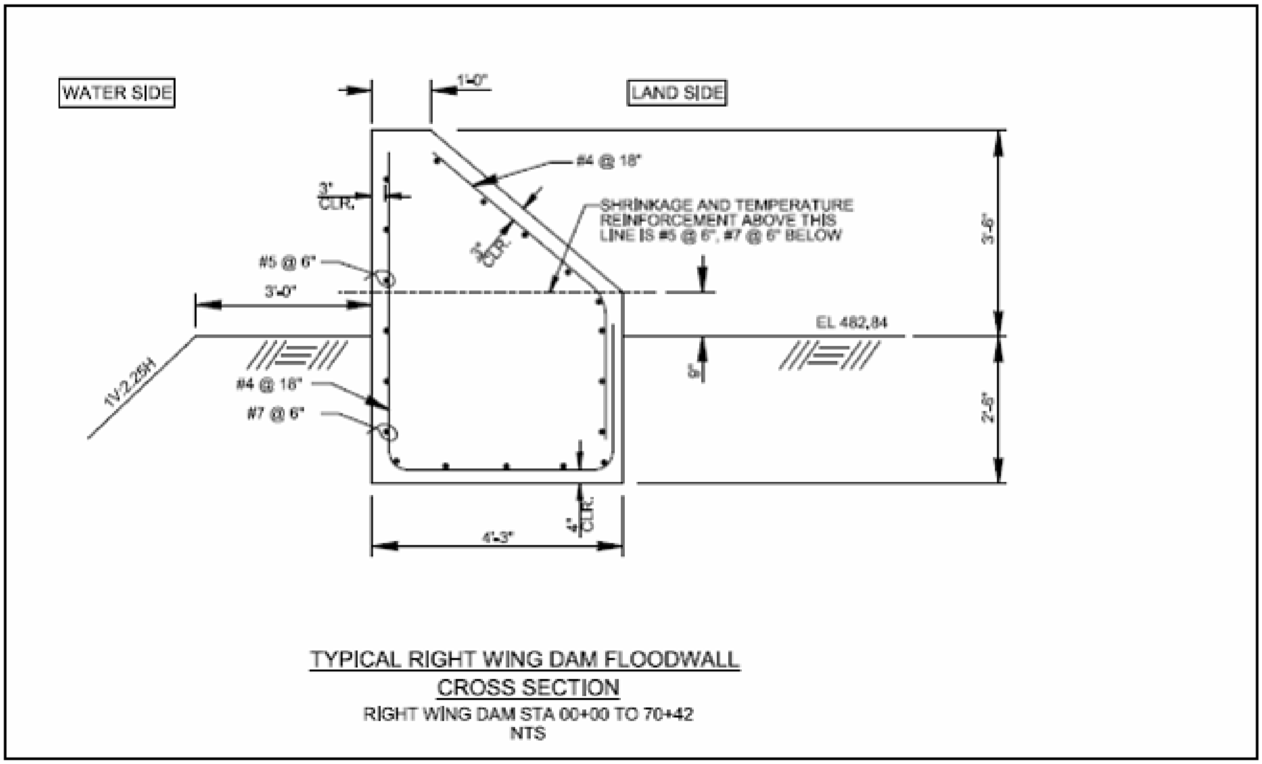

Figure 4. Example Cross Section of Concrete Floodwalls.

2.3.4 Construction Details

Tainter Gate Access, Staging Areas and Haul Roads

General construction access to the site would come from Folsom Dam Road via Auburn-Folsom Road. The contractor would require staging areas for activities including, but not limited to, assembly of construction and excavation equipment, stockpiling of materials, and fuel storage. Four potential staging areas have been defined (Figure 5), and are located within Reclamation's work yard just north of the Central California Area Office (CCAO) facilities and on top of the main concrete dam.

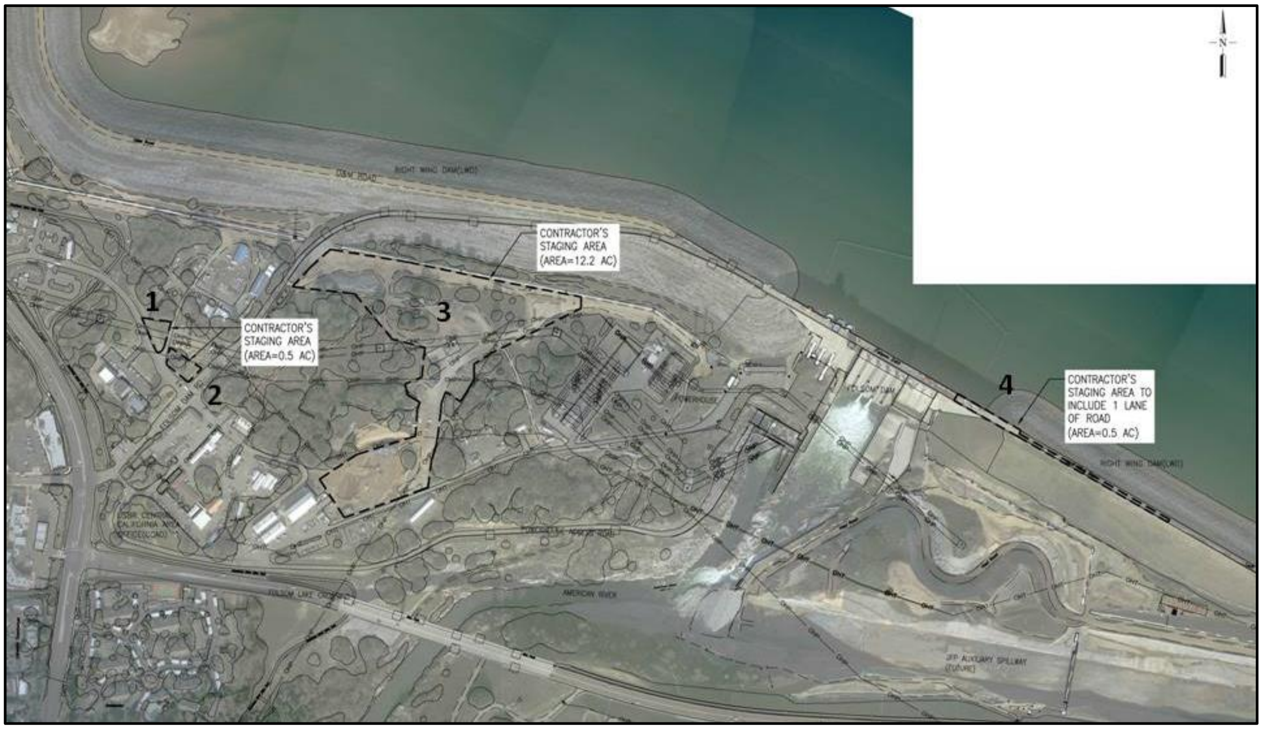

Figure 5. The Four Staging Areas for Spillway Modification with Existing Tainter Gates.

Staging areas 1 and 2 combined are 0.5 acres of previously disturbed area. Staging area 3 is 12.2 acres, the largest of the four areas. Staging area 4 is located on the left side of the main dam, is to include one lane of the road, and is approximately 0.5 acres. The vegetation and habitat within each of these staging areas is discussed in detail in Section 3.4.

There are two access points for the Right Wing Dam and the spillway (Figure 6 and Figure 7). The first is at the CCAO entrance at the USBR facility yard. The haul routes follow established roads along the top of the Right Wing Dam and through the CCAO/USBR facility. This access is restricted, however, used only with special request to USBR. The second access point, and the primary point of access for the Left Wing Dam and staging area, is at the Gate 1 access off of Folsom Lake Crossing, and the haul route would be over the control structure to the southeast end of the Left Wing Dam (Figures 6 and 7). One lane would be open to traffic across the dam at all times during the construction period. However, the traffic lane would not need to be continuous across the dam so long as a vehicle (auto/pickup) can navigate from one side to the other. Haul routes on public roads are further described in Section 3.9.

6. The CCAO Access Point to the Right Wing Dam and the Emergency Spillway. The Red Polygons Are Proposed Staging Areas; the Green Polygons are the Dam Structures.

Figure 7. The Gate 1 Access Point to the Left Wing Dam.

3.5-Foot Raise Access, Haul roads, and Staging Areas

There are several access points throughout the project area for the 3.5 dam raise alternative. Access to Dike 1 would be from the the Granite Point entrance. Haul roads would go to the top of Dike 1 as well as travel parallel to Dike 1 to the east (Figure 8), where the haul road would provide access to Dike 2. Access to Dike 3 would be from Douglas Blvd on the south end of the Dike; the haul road would follow the top of the dike.

Access to Dikes 4, 5, and 6 would be from Auburn-Folsom Road, near Dike 5 (Figure 9). The haul route to Dike 4 would follow previously used access roads from the southwest up to the toe of the dike. A second access point, also from Auburn-Folsom Road at Beal's Point, is located south of Dike 6. This also offers access to the northern end of the Right Wing Dam. The haul roads to Dikes 5 and 6 follow previously used access roads from the access point on Auburn-Folsom Road south along the toe of both dikes (Figure 9). The route near the entrance of Dike 5 would need minor grading to make it passable.

There are two access points for the Right Wing Dam (Figure 9). The first, as previously mentioned, would be from Auburn-Folsom Road at Beal's Point. The second would be at the Central California Area Office (CCAO) entrance at the USBR facility yard. This access, however, is for restricted use only. The haul routes follow established roads along the top of the Right Wing Dam and through the USBR facility. The access point for the Left Wing Dam and staging area is at the Gate 1 access off of Folsom Lake Crossing, and the haul route would be over the control structure to the southeast end of the Left Wing Dam (Figure 10).

While there are two access points off of Folsom Lake Crossing indicated on Figure 10, only one would be used to access Dike 7. The northern access point is along an established, paved entrance, and the southern access point indicated on Figure 10 would not be used at all. The haul route follows the northwestern end of Dike 7 around to the northeastern side, through the staging area and up to the previously established haul road down to Dike 8.

Dike 8 has a single access point off of E. Natoma Street and Briggs Ranch Road, along an established, paved access. The haul road, from the access point, is paved for approximately 0.01 miles before shifting to a previously disturbed dirt access road and haul routes along the east end of the dike (Figure 10).

There are three different ways to access MIAD and the associated staging areas. The first is to follow the haul road from Dike 8. The other two are off of Green Valley Road (Figure 11), one about 1/3rd up the dike, and the second at the northeastern end of the dike where Green Valley Road intersects with Access Road. The haul road, which comes from Dike 8, follows currently used access roads up to the top of MIAD and across to the Access Road (Figure 10).

In general, all the dirt haul routes would need to be routinely graded with a blade to repair ruts from truck usage. Rock would be added to control mud and dust, and water trucks would also be used to control dust on all roads. Haul routes on public roads are further described in Section 3.9. Entrances and exits of the roads at the toe of each dike would be rocked; there would be no need to rock the existing roads at the top of the dikes. The existing road base at the top of the dikes would be used to haul road rock, as necessary.

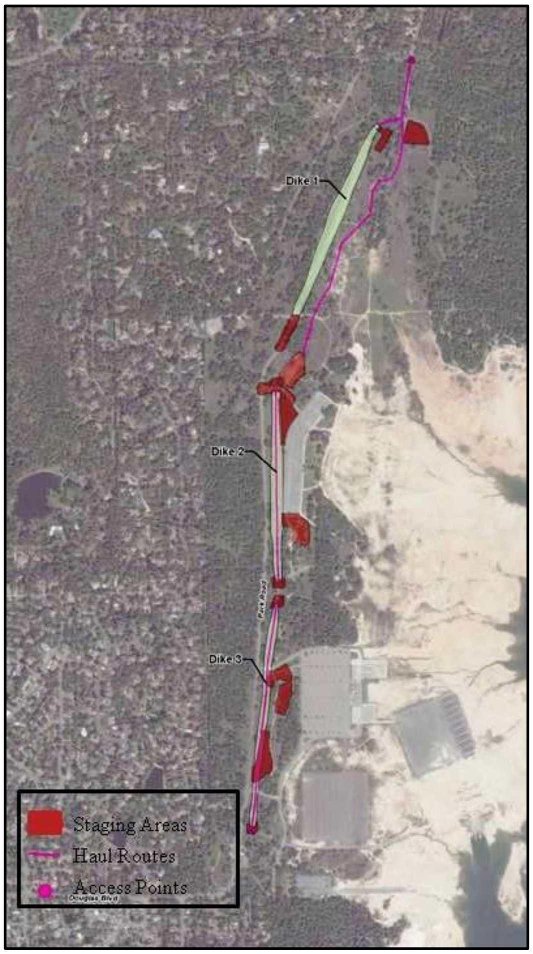

Figure 8. Staging Areas Associated with Dikes 1, 2, and 3.

Figure 9. Staging Areas Associated with Dikes 4, 5, and 6 and the Right Wing Dam.

Figure 10. Staging Areas Associated with Dikes 7 and 8 and the Left Wing Dam.

Figure 11. Staging Areas Associated with the Mormon Island Auxiliary Dam.

There are a total of 31 staging areas within the project area for this alternative (Figures 6 through 11, also Appendix B). All of the staging areas have been previously disturbed for a total of 157.2 acres. The vegetation and habitat within each of these staging areas is discussed in detail in Section 3.4. The staging areas would not be used simultaneously, but would be utilized in association with each construction phase of each dike (see *Construction Schedule* below). For example, the 12.91 acres of staging areas associated with Dikes 1, 2, and 3 would be utilized during the construction phase scheduled for calendar year 2018-2020.

Two staging areas near Dikes 4, 5, and 6 are located within the water-side of the lake. These staging areas are, during periods of drought-induced low water levels in the lake, have been used by the USBR for previous work on the three dikes. They are to be used for staging equipment, vehicle parking, stockpiling of random unsorted materials, etc. Fuels and other hazardous material would not be stored in the lakeside staging areas. However, if lake levels rise due to a change in drought conditions, these staging areas would not be used; other staging areas located on the land side of the dikes would be utilized instead. As a general note, all staging areas are proposed at this time, but staging would generally occur in previously disturbed areas with limited vegetation.

Borrow and Disposal Sites

The majority of materials necessary for each alternative would be obtained from an established borrow site within 30 miles of the proposed project site. All disposal sites would be at permitted landfills or established disposal sites within 30 miles of the proposed project site.

Some rip-rap could be available and utilized from the stockpile at the MIAD East location (resultant from Prior JFP phases and the restoration of the Dike 7 Office Complex staging area. See below, and Figure 12.) Rip-rap removed from the Dike 7 Office Complex (Dike 7) staging area for the post-construction restoration of the staging area would be placed within the disposal area of MIAD East. This could involve as much as 100,000 cy of rip-rap and would not exceed a maximum of 200,000 cy of rip-rap. The rip-rap would be removed from the Dike 7 staging area using equipment such as excavators and bulldozers, placed in dump trucks, then hauled to the MIAD East disposal area using the existing internal haul road. It is likely that the rip-rap would be placed (disposed of) in the northwestern portion of the disposal area near the existing haul road as shown in Figure 12 (purple hatching). The placement area would be positioned at least 100 feet away from the southern toe of the Mormon Island Auxiliary Dam. The maximum area occupied by the disposed rip-rap would range from approximately 6.5 to almost 8 acres, based on a rip-rap pile height ranging from 8 to 10 feet above the soil surface. The top of the completed rip-rap disposal pile would be relatively level, although it would follow the topography of the underlying soil, and edges of this pile would have approximately 1H:2V side slopes

As described in the Folsom Dam Modification Project: Phase V Site Restorationand Related Mitigation Activities Final Supplemental Environmental Assessment/Environmnetal Impact Report, March 2016 [Phase V]), following disposal of the rip-rap, a state agency such as DWR would have until October 1, 2017 to remove all the disposed rip-rap from the MIAD East Area and transport it off-site for use in another project. This deadline could be extended if approved by Reclamation via a third-party agreement between Reclamation and the state agency. The Corps would also execute an agreement with Reclamation indicating that if a state agency ultimately decides not to remove the rip-rap, then the Corps would remove the rip-rap from the MIAD East Area for use in the Dam Raise Project. Regardless of the party removing/using the rip-rap, it would ultimately be removed from the MIAD East Area, which is why the proposed initial disposal of rip-rap in this area is considered to be temporary. The reader is advised, however, that the rip-rap may not be removed from the MIAD East Area for several years.

If a state agency decides to remove the rip-rap, that agency would be responsible for preparing an appropriate environmental document to address the environmental impacts associated with the collection, transport, and use of the rip-rap removed from the MIAD East Area. If instead the Corps removes the rip-rap, the Corps would be responsible for preparing an appropriate environmental document to address the environmental impacts associated with removal and use of the rip-rap. Such environmental documents would include implementation of mitigation measures and/or BMPs if necessary (March 2016)

Site Preparation and Post-Construction Restoration and Cleanup

Prior to construction, the staging areas and dikes would be cleared of grasses and herbaceous vegetation. All the trees in the staging areas or in the footprint of the dikes would be avoided to the greatest extent practicable. If some trees need to be trimmed or removed prior to construction, the Corps would conduct a site visit to determine the impact to the trees and make a determination about possible actions prior to construction. All trimming of trees would be done outside of the nesting season as much as possible.

Following the completion of the major proposed construction activities within the proposed project area, a mixture of native grass and forb seeds would be planted throughout in order to establish a permanent vegetative groundcover. All seeds would be procured from California native seed growers. Table 2 below provides a preliminary list of the grass/forb seed mixture that would be planted. This list and/or the seeding rates (pounds per acre) may be revised somewhat to account factors such as specific site conditions, the planting method used, and the availability of seed stock.

Table 2. Preliminary list of grasses and forbs to be planted (seeded) in the proposed project area for restoration.

Common Name	Scientific Name	Pounds PLS per Acre
California brome	*Bromus carinatus*	10
Blue wildrye	*Elymus glaucus*	2
Squirrel tail	*Elymus elymoides*	2
California poppy	*Eschscholzia californica*	3
California fescue	*Festuca californica*	2
Meadow barley	*Hordeum brachyantherum*	5
Creeping wildrye	*Leymus triticoides*	4
Miniature lupine	*Lupinus bilcolor*	3
Nodding needlegrass	*Nasella cernua*	2
Purple needlegrass	*Nassella pulchra*	2
Pine bluegrass	*Poa secunda*	5
Tomcat clover	*Trifolium willdenovii*	3
Small fescue	*Vulpia microstachys*	2
Total Seed Mixture		**45**

PLS = Pure Live Seed. Pounds indicated are based on broadcast seeding or hydroseeding.

Disking would be performed prior to seeding to prepare the soil for seed placement. In compacted areas, the soil would be ripped or scarified to help reduce compaction. The method of seeding would be left to the contractor to determine, using hydroseeding, broadcast seeding, drill seeding, or a combination of these methods. In addition, soil imprinting may be employed in some areas to minimize seed runoff and help with local rainwater infiltration. Imprinting is a technique of soil-rolling that leaves small depressions in the soil surface that help break runoff, improve water infiltration, and prevent seed washout. Additonally, after the construction is complete, all temporary construction items such as signage, temporary fencing, etc., would be removed.

The staging area located at the Dike 7 Office Complex, currently a paved parking lot and temporary structures, would be restored to habitat. This area has been used by prior phases of the Folsom JFP (Phase V, March 2016), and the 2007 FEIS/EIR previously addressed use of the Dike 7 Office Complex Area as a construction staging and storage area. A construction office complex/construction staging and storage area was built immediately south of Dike 7 during prior phases of the Folsom JFP. This area includes two parking areas; one located southeast of the entry road to the complex and one located northwest of the entry road. Restoration work is necessary to comply with prior commitments set forth in the PACR 2007 FEIS/EIR and in the Land Use Agreement (LUA). All equipment, temporary buildings, fencing, and structures would be removed from the complex. Both parking lots, consisting of asphalt and base material, would be removed, stored at MIAD East, and eventually used as rip-rap, and the area would be restored topographically and revegetated, as described in the Phase V SEA/EIR (March 2016). The proposed topographic restoration of the Dike 7 Office Complex staging area would largely be accomplished by re-distributing the existing native ground materials ("soil") located within the area through excavation, filling, and grading. This process would not require importing new fill or exporting excavated soil. Restored areas would be re-contoured in a manner to mimic natural slope appearance and to restore natural hillside slopes where practicable to pre-project conditions, and would be reseeded with native grasses and forbs (see above). As described in the Phase V SEA/EIR (Corps 2016) the resultant rip-rap field stored at MIAD East from the Dike 7 Office Complex staging area restoration would occupy as much as 6.5 to 8 acres. See Figure 12 for the rip-rap storage site at MIAD East.

Figure 12. MIAD East Area and the Potential Stockpile (purple hatching) within this Area (Corps 2016).

Construction Works and Schedule

The number of private construction employees present onsite each day would vary with scheduled construction activities. Up to 60 workers can be expected onsite any one day for the Spillway Modification with Existing Tainter Gates work. Up to 50 workers can be expected onsite any one day for the 3.5 foot dam earthen raise and concrete floodwall portion of the alternative. The construction work schedule would consist of 10-hour days over 6 days per week throughout the entire year. Twenty-four hour shift schedules may be requested when the construction schedule cannot be met in any other way. However, the double-shift schedule would be temporary and short-term, and potential impacts resulting from a 24-hour work schedule would be analyzed in the event such would need to occur.

The work on the emergency spillway and tainter gates would have an expected project length of approximately 3 years, starting calendar year 2017. This includes pre-work planning, site preparations, setting up office facilities, haul route improvements, and the construction of the tainter gates. Demobilization and site restoration after construction would require approximately 16 days.

The 3.5 foot dam earthen raise and concrete floodwalls would have an expected project length of approximately 4 years, starting calendar year 2017. This includes pre-work planning, site preparations, setting up office facilities, haul route improvements, and the construction of the tainter gates. Demobilization and site restoration after construction would require approximately 16 days. The alternative would be broken up into three “work packages”, separating out the dikes into work years. Work package 1, consisting of work on Dikes 4, 5, and 6, would be awarded in calendar year 2017, with a construction duration of 2 years. Work package 2, consisting of work on Dikes 7, 8, MIAD, and the LWD and RWD, would be awarded in calendar year 2019, with a construction duration of 2 years. Work package 3, consisting of work on Dikes 1, 2, and 3, would be awarded in calendar year 2018, with a construction duration of 2 years.

2.3.5 Operation and Maintenance

Operation and Maintenance requirements of the proposed project would not initially change with Alternative 2. However, the raise would result in an ablity to sustain an increased flow of 160,000 cfs for a longer period of time, and would have possible inundations up to 486.34’ (NAVD88). Any post-construction operational changes would be defined in a Water Control Manual update and any O&M effects from the Dam Raise Project would be covered in a subsequent environmental document.

Generally speaking, until the Water Control Manual is updated after construction, the Operation and Maintenance requirements would be no different than existing O&M for both the 3.5-foot dam raise and the spillway tainter gate modification, with the exception of some reduced maintenance in a couple of areas:

- The new cable hoist system would be stainless steel with greaseless bearings, so chain maintenance is significantly reduced to periodic inspection.

- The removal of hoist motor redundancy linkage would also remove associated maintenance of this element.

- There would be an added inspection element with the new top seal. The current design is that it would be concrete with embedded steel components for connection of rubber seals and connections to the piers. The top seal would be an extremely low maintenance element but would be an extra item to look at during periodic inspections.

2.3.6 Environmental Commitments

The following avoidance and minimization measures are required and would be conducted by the Corps or the project contractor, as appropriate, to reduce impacts to a less-than-significant level for Recreational Resources:

- Throughout the construction period, an effort would be made to maintain as much public access to recreation areas and trails by implementing traffic control measures, grade separated vehicular and/or pedestrian crossings, and/or temporary alternate public access detours for both pedestrian and vehicular traffic, as described in Section 3.3.5.

- Warning signs and signs restricting access would be posted for public safety before and during construction, as necessary.

- Public outreach would be conducted through mailings, posting signs, meetings, and coordination with interested groups, if necessary, in order to provide information regarding changes to recreational access in and around Folsom Lake.

The following avoidance and minimization measures are required and would be conducted by the Corps or the project contractor, as appropriate, to reduce impacts to a less-than-significant level for Wildlife and Vegetation:

- To minimize dust impacts to vegetation, wetlands, and breeding wildlife, dust control measures consistent with SMAQMD fugitive dust control measures would be implemented. Unpaved access roads would be frequently watered with raw water to prevent visible dust.

- To prevent importation of exotic and invasive plant and animal material, contractors would clean all mud, soil, plant, and animal material from vehicles and equipment before entering the project area.

- Before the project commences, native vegetation and habitat areas would be identified to be protected. Detailed pre-construction site drawings would be created to identify vegetated and habitat areas to be avoid, and would be fenced and signed for protection. Site drawings would be accompanied by a narrative detailing the vegetation and wildlife protection plan. No off-road traffic would occur outside of identified staging areas.

- Areas not to be disturbed would be clearly defined by signing, fencing, or other techniques. Impact to native trees, shrubs, and aquatic vegetation would be avoided to the greatest extent possible. Construction would be implemented in a manner to minimize disturbance of such areas.

- Woody vegetation at all staging areas, borrow sites, and haul routes would be enclosed with protective construction fencing. Where possible, a buffer would be provided one and a half times the distance of the drip-line. Temporary fencing would also be used during construction to prevent damage to native trees. Coordination with a Corps biologist would occur prior to commencement.

- Except as identified in the project drawings or plans, no tree or shrub would be removed without prior agency consultation and examination of alternatives – all feasible construction or staging alternatives would be exhausted before removal of any oak, pine, or riparian tree occurs.

- Before and during the nesting season, a qualified biologist would conduct nesting surveys along proposed construction sites, haul roads, staging areas, and stockpile sites. Work activity around nests would be avoided until young have fledged.

- Avoidance measures would be conducted before nesting season to prevent nesting on equipment and structures. No active nests would be disturbed so as to cause take in the forms of disturbance, harassment, or nest abandonment.

- A qualified avian biologist/environmental monitor would be employed up to a full-time basis onsite, as needed, to ensure project compliance with the Migratory Bird Treaty Act and other environmental mitigations/protections.

- All construction personnel would undergo environmental protection training to be aware of all required environmental protections per these mitigations and by federal/state law.

- Construction materials least likely to lead to entrapment of wildlife would be used and/or removed nightly as applicable. All trash and food-related waste would be placed in self-closing trash containers and removed nightly.

- All BMPs would be strictly followed to prevent spills of toxic substances. No fueling would be allowed onsite, and appropriate materials for spill containment and cleanup would be maintained onsite. No staging of vehicles or equipment would be conducted within 50 feet of the water edge of Folsom Lake to prevent accidental inundation and toxic infiltrations.

The following avoidance and minimization measures would be required and conducted by the Corps or project contractor, as appropriate, to reduce impacts to a less-than-significant level for Special Status Species:

Valley Elderberry Longhorn Beetle

- A minimum setback of 100 feet from the drip-line of all elderberry shrubs would be established (if possible). If the 100-foot minimum buffer zone is not possible, the next maximum distance allowable would be established. These areas would be fenced, flagged, and maintained during construction. When a 100-foot (or wider) buffer is established and maintained around elderberry shrubs, complete avoidance (i.e. no adverse effects) would be assumed.

- Where encroachment on the 100-foot buffer has been approved by the USFWS, a setback of 20 feet from the drip-line of each elderberry shrub would be maintained whenever possible.

- During construction activities, all areas to be avoided would be fenced and flagged. Any damage done to the buffer area would be restored and buffer areas would continue to be protected after construction.

- Signs would be placed every 50 feet along the edge of the elderberry buffer zones. The signs would include: "This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs shall be readable from a distance of 20 feet and would be maintained during construction.

- No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant would be used in the buffer area.

- Elderberry shrubs that cannot be avoided would be transplanted to an appropriate riparian area at least 100 feet from construction activities – any areas that receive transplanted elderberry shrubs and elderberry cuttings would be protected in perpetuity.

- If possible, elderberry shrubs would be transplanted during dormant season (approximately November through the first two weeks in February). If transplantation occurs during the growing season, increased mitigation ratios would apply.

- Environmental awareness training would be conducted for all workers before they begin work. The training would include status, the need to avoid adversely affecting the elderberry shrub, avoidance areas and measures taken by the workers during construction, and contact information.

- Monitoring of the mitigation site would occur for ten consecutive years or for seven non-consecutive years over a 15-year period. Annual monitoring reports would be submitted to USFWS. The mitigation site would be selected prior to construction.

Swainson's Hawk

- Swainson's hawk surveys would be completed in compliance with the CDFW survey guidance (Swainson's hawk Technical Advisory Committee 2000).

- If active nests are found, a one-half mile buffer between construction activities and the active nest(s) would be maintained.

- In addition, a qualified biologist would be present onsite during construction activities to ensure the buffer distance is adequate and the birds are not showing any signs of stress.

- If signs of stress that could cause nest abandonment are observed and noted, construction activities would cease until a qualified biologist determines that fledglings have left an active nest.

Bald Eagle

- Bird nest surveys for bald eagles and other special status migratory birds could be conducted concurrently with Swainson's hawk surveys – at least one survey would be conducted no more than 48 hours before the initiation of project activities to confirm the absence of nesting.

- If active nests are found, a one-half mile buffer between construction activities and the active nest(s) would be maintained.

- In addition, a qualified biologist would be present onsite during construction activities to ensure the buffer distance is adequate and the birds are not showing any signs of stress.

- If signs of stress that could cause nest abandonment are observed and noted, construction activities would cease until a qualified biologist determines that fledglings have left an active nest.

- Would be conducted within one-half mile of construction activities, including grading, for all trees and shrubs that would be removed or disturbed.

The following avoidance and minimization measures would be required and conducted by the Corps or the project contractor, as appropriate, to reduce impacts to a less-than-significant level for Air Quality:

- Maintain all construction equipment in proper working condition according to manufacturer's specifications – equipment checked by certified mechanic before operation.

- Use diesel-fueled equipment manufactured in 2003 or later, or retrofit equipment manufactured prior to 2003 with diesel oxidation catalysts.

- Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) would be repaired immediately.

- At least 48 hours prior to use of heavy-duty, off-road equipment, the project contractor would provide SMAQMD with the anticipated construction timeline including start date, and the names and phone numbers of the project manager and onsite foreman.

- SMAQMD's Basic Construction Emissions Control Practices would be implemented to control fugitive dust and diesel exhaust emissions.

- To further reduce hydrocarbon emissions, SMAQMD recommends that the project implement a set of Enhanced Exhaust Control Practices.

- If the project's construction contractor determines that construction activities would actively disturb more than 15 acres per day, then the contractor would be required to conduct PM10 and PM2.5 dispersion modeling.

The following avoidance and minimization measures would be required and conducted by the Corps or project contractor, as appropriate, to reduce impacts to a less-than-significant level for Climate Change:

- Minimize the idling time of construction equipment to no more than 3 minutes or shut equipment off when not in use.

- Maintain all construction equipment in proper working condition.

- Encourage carpools, shuttle vans, and/or alternative modes of transportation for construction worker commutes.

- Use locally sourced or recycled materials for construction materials as much as practicable.

- Develop a plan to efficiently use water for adequate dust control.

- Use low carbon concrete if economically and engineering feasible.

- BMPs and the standard construction avoidance and minimization measures as recommended in the SMAQMD's "Guidance for Construction GHG Emissions Reductions" would be implemented to further reduce GHG emissions.

The following avoidance and minimization measures would be required and conducted by the Corps or project contractor, as appropriate, to reduce impacts to a less-than-significant level for Aesthetics and Visual Resources:

- Modifications to dikes and dams around Folsom Reservoir would occur in phases, limiting the extent of construction affects at any one time.

- Measures would be incorporated into the project design to minimize effects on riparian vegetation, and ensure use of appropriate erosion control methods, thereby lessening the visual effects of vegetation loss.

- Staging areas would be located throughout the project area on previously disturbed areas and their use would not constitute a substantial change from existing visual resource conditions.

The following avoidance and minimization measures would be required and conducted by the Corps or project contractor, as appropriate, to reduce impacts to a less-than-significant level for Traffic and Circulation:

- The construction contractor would be required to prepare a traffic management plan, outlining proposed routes to be approved by the appropriate agencies, and implement the plan prior to initiation of construction.

- High collision intersections would be identified by the appropriate local entity, and avoided if possible.

- Construction and haul drivers would be informed and trained on the various types of haul routes, and areas that are more sensitive (e.g. high level of residential or education centers, or narrow roadways).

- The project would develop and use signs to inform the public of the haul routes, route changes, detours, and planned road closures to minimize traffic congestion and ensure public safety.

The following avoidance and minimization measures would be required and conducted by the Corps or project contractor, as appropriate, to reduce significant impacts to a less-than-significant level for Noise:

- Construction times would be limited in accordance with the City of Sacramento Noise Ordinance exemption for construction (City of Folsom, 2009).

- Construction equipment noise would be minimized during project construction by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications), and by shrouding or shielding impact tools.

- All equipment, haul trucks, and worker vehicles would be turned off when not in use for more than 30 minutes.

- Equipment warm-up areas, water tanks, and equipment storage areas shall be located as far away from existing residences as feasible.

- Provide written notice of construction activities within 2,000 feet of residences or other sensitive receptors, identifying the type, duration, and frequency of construction activities. Notification materials would also identify a mechanism to register complaints if construction noise levels are overly intrusive or if construction occurs outside specified hours.

- Residences and businesses would be notified about the type and schedule of construction at least two weeks prior to mobilization.

- The contractor would measure surface velocity waves caused by equipment, monitoring vibration up to threshold values established and approved in writing by USACE – no vibrations would exceed 0.2 inch per second.

- Public meetings would be scheduled with affected residents to ensure they are informed of the project schedule and its potential effects.

The following avoidance and minimization measures would be required and conducted by the Corps or project contractor, as appropriate, to reduce impacts to a less-than-significant level for Water Quality:

- Implement appropriate measures, such as straw wattles and silt fencing, to prevent debris, soil, rock, or other material from entering the water.

- Use of a water truck or other appropriate measures to control dust on haul roads, construction areas, and stockpiles.

- Oil and other liquids would be properly disposed of. Fuels and hazardous materials would not be stored onsite. Inspect vehicles and equipment to prevent dripping of oil or other fluids.

- Fuel and maintain vehicles in a specified area that is designed to capture spills – cannot be near any ditch, stream, or other body of water or feature that may convey spills to a nearby body of water.

- Schedule construction to avoid the rainy season as much as possible. If rain is forecast during construction, additional erosion and sedimentation control measures would be implemented.

- Maintain sediment and erosion control measures during construction. Inspect the control measures before, during, and after a rain event.

- Train construction workers in storm water pollution prevention practices.

In addition, in accordance with 29 CFR 1926.62 Lead and 8 CCR 1532.1 Lead, on all construction jobs where lead is present, the following is required:

- Lead dust on surfaces, especially in eating areas, must be controlled by HEPA vacuuming, wet clean-up, or other effective methods.

- Workers must have washing facilities with soap and clean water for hand and face washing.

- Workers must receive training on lead hazards and how to protect themselves.

- A written compliance program to assure control of hazardous lead exposures.

- Employers must assess the amounts of lead breathed by workers – usually done by employee breathing-zone air sampling.

All consultation and permits required by federal, state or local laws, regulations or policies are found in Chapter 5.0 of this document.

2.4 Comparison of Alternatives

Table 3 shows the overall level of significance for each issue area. It also provides a comparison of significance determinations among the No Action Alternative and Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall. These three alternatives are analyzed in this DSEIS/SEIR as the final array of alternatives considered. Other alternatives have been screened out due to various reasons described in Section 2.1.1.

Table 3. Comparison of the Environmental Impacts of the Folsom Dam Raise Project.

	Alternative 1 – No Action Alternative	Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall
Recreational Resources		
Effects	Existing recreational opportunities would not be disturbed. The public would have continued use of the FLSRA without any closures or access restrictions unless a flood event occurs.	Modification of the spillway gates would not restrict access to recreational facilities or resources. There would be no substantial disruptions to the use of existing recreational facilities. The direct effects would result in a severe restriction to recreational facilities and resources with a substantial long-term disruption to the use of an existing recreational facility. Mitigation, avoidance, and minimization efforts would likely reduce the effects of the proposed alternative to recreational users to less-than-significant, however once the detours are identified and analyzed, a subsequent environmental document will be prepared if needed.
Significance	Not applicable.	Expected to be less than significant; however, significant effects could remain even with mitigation, avoidance, and minimization measures.
Mitigation	None required.	Traffic control measures, grade separated vehicular and/or temporary alternate public access detours for both pedestrian and vehicular traffic would be used. To ensure public safety, warning signs and signs restricting access would be posted before and during construction. Public outreach would be conducted through mailings, posting signs, coordination with interested groups, in order to provide information regarding changes to recreational access in and around Folsom Lake.
Vegetation and Wildlife		
Effect	No construction related effects (direct or indirect) to vegetation or wildlife would occur—conditions in the project area would remain consistent with existing conditions.	A construction footprint of up to 50 feet on both sides of Dikes 1 through 8 and MIAD would remove vegetation and disturb the ground surface at up to thirty-one staging areas.

		Indirect adverse impacts to woodland vegetation would include increased erosion, damage to roots of trees by heavy equipment, dust impacts to roadside vegetation, and invasion of exposed substrate by exotic and noxious plant species. Construction associated with gate modifications and raising embankment dams and dikes could temporarily disturb nesting birds. Disturbance from vehicle and pedestrian traffic and machinery would particularly disturb nesting raptors, turkeys, and migragtory birds in the project area. Construction noise and traffic is expected to disturb and/or displace local wildlife that utilizes oak and pine woodlands and grasslands over the project duration.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	None required.	State and USFWS protocols for survey and protection of nesting raptors and migratory birds would be followed for the project. Mitigation would occur, with the project area returned to pre-existing conditions to the extent practicable at the completion of this project. Mitigation will be completed for any oak woodland habitat adversely affected by the project. Implementation of BMPs listed in Section 3.4.5 would be conducted by the Corps or project contractor, as appropriate, to reduce impacts to a less-than-significant level.
Special Status Species		
Effects	There would be no construction-related effects to existing special status species or critical habitat; however, a PMF flood event may result in the loss of critical habitat and special status species could be adversely affected. The types of special status species and their associated habitats would remain the same.	Construction could potentially result in both direct and indirect effects to elderberry shrubs. Direct effects due to removal or damage to shrubs during site preparation and construction activities. Indirect effects would include physical vibration and an increase in the dust during operation of equipment and during construction activities.
Significance	Not applicable.	Less than significant with mitigation.

Mitigation	None required.	Loss/removal of elderberry shrubs would be compensated for by transplanting shrubs to an approved location and monitored for 5 years. Additionally, elderberry shrubs and associated natives would be planted at an existing Corps mitigation site or credits would be purchased at a USFWS approved mitigation bank. Implementation of BMPs discussed in Section 3.5.5 would also be necessary during construction to prevent mortality or incidental take of special status species (Valley Elderberry Longhorn Beetle, Swainson's Hawk, and the Bald Eagle).
Air Quality		
Effects	There would be no construction-related effects on air quality in the project area. Air quality would continue to be influenced by climatic and geographic conditions, local and regional emissions from vehicles and households, and local commercial and industrial land uses. A possible flood event may temporarily increase the amount of vehicle emissions during flood-fighting activities, as well as increase the amount of vehicle emissions resulting from clean-up activities.	Combustion emissions would result from the use of construction equipment, truck haul trips, and worker vehicle trips to and from the construction site. Combustion emissions would vary from day to day, and would temporarily contribute incrementally to regional ozone concentrations over the construction period. Exhaust emissions from these sources would include ROG, NOX, and PM10. Exhaust emissions would vary depending on the number and type of equipment, the duration of its use, and the number of construction worker and haul trips to and from the construction site. Construction emissions would last approximately 4 years.
Significance	Not applicable.	Significant effects would occur even with the implementation of avoidance and minimization measures. Emissions would not be reduced below the USEPA's general conformity *de minimis* threshold. However, compliance would be accomplished with the completion of a General Conoformity Analysis, or with the inclusion in the State Implementation plan, therefor impacts would be less than significant with mitigation.
Mitigation	None required.	SMAQMD recommends the project implement a set of Enhanced Exhaust

		Control Practices for further reduction in hydrocarbon emissions. In order to achieve the required reductions in emissions the BMPs in Section 3.6.5 would be followed, in addition to the SMAQMD Guidance for Construction GHG Emissions Reductions.
Climate Change		
Effects	There would be no construction-related effects on climate change. Locally generated emissions, including levee operations and maintenance, would continue.	There are no conflicts with any Statewide or local goals with regard to reduction of GHG; therefore, there would be no significant effects on climate change. Significant short-term increase in CO_2 would occur but this effect would be temporary.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	None required.	BMP and GHG mitigation plans would be implemented—the GHG mitigation plan would consist of feasible mitigation measures (one or multiple), being implemented to reduce impacts. BMPs to be implemented and incorporated in the design of the work are listed in Section 3.7.5. In addition to implementing BMPs, the State would monitor emissions and implement all feasible mitigation measures.
Aesthetics and Visual Resources		
Effects	The visual resources around Folsom Reservoir would remain undisturbed. Construction work, outside of routine maintenance and projects that are already underway or planned, would not contribute to any change in visual quality within the study area.	Raising the dams and dikes would not significantly alter the visual character of the FLSRA. The 3.5-foot raise of the dikes and dams may temporarily impair visual resources during each 2 year construction period. Increased construction traffic on Auburn-Folsom Road would affect views of the area from several homes from across the street and may be visible to recreation users on the trails. During construction, recreationalists would not have access to the trail on top of the dikes and would need to utilize the trail detour.
Significance	Not applicable.	Less than significant with mitigation.

Mitigation	None required.	Modifications to dikes and dams around Folsom reservoir would occur in phases. Measures would be incorporated into the project design to minimize effects on riparian vegetation and ensure use of appropriate erosion control methods. Staging areas would be located throughout the project area on previously disturbed areas.
Traffic and Circulation		
Effects	The project would not create additional traffic during construction around the proposed project area. The existing roadway network, types of traffic, and circulation patterns would be expected to increase traffic by 2% each year.	Vehicle trips to Folsom Dam from the surrounding area would increase slightly as a result of labor force trips and haul truck trips. Transportation and circulation effects resulting from this action are temporary in nature and would not result in permanent traffic increases to the surrounding area. Construction of the dike and dam raises would have temporary direct effects on the traffic and circulation in the project area. Traffic would substantially increase in relation to existing traffic load and capacity of the roadway system and has the potential to substantially disrupt the flow and/or travel time of traffic.
Significance	Not applicable.	Impacts are considered significant and unavoidable as it will substantially increase traffic even with proposed avoidance, minimization, and mitigation measures.
Mitigation	None required.	BMPs listed in Section 3.9.5 would be implemented to avoid or minimize any effects, as well as ensure public safety on project area roadways.
Noise		
Effects	There would be no construction-related effects to the acoustic environment, including the generation of ground-borne vibration. The noise levels in the study area would remain consistent with the existing ambient noise levels present under current conditions. Sources of noise and noise levels would continue to be determined by local activities, development, and natural sounds.	Construction on the southeastern perimeter of the reservoir could cause substantial temporary increase in the ambient noise level. Residents, wildlife, and recreationists could be affected and experience noise from construction vehicle motors and construction activities—noise increases would be temporary and intermittent.

		Temporary noise effects associated with the raise and modification of Folsom Dam would be considered less than significant, due to the distance between noise sources and potential receptors being large enough to attenuate noise.
Significance	Not applicable.	Implementation of minimization measures would reduce noise effects on residences close to the dam, but not to a less than significant level.
Mitigation	None required.	Construction times would be limited in accordance with the City of Folsom, Sacramento County, and Placer County Noise Ordinances. BMPs listed in 3.10.5 would be implemented to further reduce the effects of construction noise to a less-than-significant level.
Water Quality		
Effects	Water resources and quality would not be affected by construction in the project area. The surface and groundwater conditions would continue to be affected by contaminants through runoff. Extreme flooding events could wash siltation and contaminants into the water system, and if emergency work became necessary to prevent dike failure, measures required for the protection of water quality might not be used.	Some of the work on the spillway gates would be done over water with potential for lead paint to enter surface water downstream of the dam—lead paint is assumed present in all underlying primer on the structure. Project activities, such as drilling, excavation, hauling, and fill placement may disturb or mobilize sediments, having the potential to affect total suspended solids, pH, turbidity, and dissolved oxygen. The dike raises and construction of the concrete floodwall with the use of identified staging areas could have short-term direct impacts on water quality from ground-disturbing activities. Debris and inadvertent spills of fuels, oils, or concrete mix materials from construction equipment, work areas, or the staging areas could be a source of contamination into adjacent waterways. Run-off could result from excavation activities with potentially higher concentrations of total dissolved solids—

		there is a potential to create turbidity and introduce associated contaminants into the receiving waters. Across the entire construction site, debris, soil, or oil and fuel spills could temporarily adversely affect the water quality at Folsom Lake.
Significance	Not applicable.	Impacts would be less-than-significant with mitigation, NPDES permits, and implementation of BMPs.
Mitigation	None required.	Construction contractor is required to obtain permit coverage under the National Pollutant Discharge Elimination System (NPDES). BMPs listed in 3.11.5 would be incorporated into the project. All necessary measures would be followed as required when lead is present during construction in accordance with 29 CFR 1926.62 Lead and 8 CCR 1532.1 Lead. Construction and post-construction monitoring should be conducted to ensure that all pollution prevention efforts are being performed as described in the Storm Water Pollution Prevention Plan (SWPPP).
Cultural Resources		
Effects	A potential adverse effect to historic properties (cultural resources eligible for listing in or listed in the National Register of Historic Places) or tribal cultural resources could result from a large storm event. The effects would depend on the location of the failure in the system and severity of the storm. As a result, a precise determination of adverse effect and the significance of the effect is not possible and cannot be made.	Alternative 2 would result in no adverse effects to historic properties. Existing historic properties would undergo physical changes, however these modifications constitute no adverse effect to the qualities that make the historic properties eligible for inclusion in the NRHP. No adverse effects to tribal cultural resources are anticipated.
Significance	Not applicable.	Not applicable.
Mitigation	None required.	None required.

CHAPTER 3.0 - AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION

3.1 Introduction

This chapter describes the existing environmental resources in the area that would be affected if any of the alternatives are implemented, and it describes the environmental consequences of the alternative plans on those environmental resources. A description of the existing conditions is presented in the Affected Environment section of each resource. Potential effects of project alternatives to the resource are discussed in the Environmental Consequences section. Mitigation measures identified to avoid, minimize, or compensate for adverse project effects are discussed in the Mitigation Measures section. Further explanation on how these sections were developed follows.

This chapter describes existing conditions and future without project conditions in the study area. The future without project conditions are the expected physical, environmental, and social conditions in the study area if no dam raise or gate modifications are constructed. The without project condition is the condition against which flood protection plans are formulated and evaluated, and also serves as the environmental baseline for assessing effects of the alternatives. The No Action Alternative constitutes the future without project conditions that would reasonably be expected in the absence of the proposed action and serves as the environmental baseline, per NEPA, against which the effects and benefits of the action alternatives are evaluated. The environmental baseline for CEQA is assumed to be the existing conditions.

The baseline environmental conditions assumed in this DSEIS/SEIR for analyzing the effects of the Folsom Dam Raise Project consist of the existing physical environment as of 2014, the year when the Notice of Preparation (NOP) was published to prepare a DSEIS/SEIR with the State Clearinghouse. The 2014 existing physical environment is consistent with the current conditions in the project area because no major changes to resources has occurred within the last several years. The Corps published the Notice of Intent (NOI) in the Federal Register for this DSEIS/SEIR concurrent with issuance of the State's NOP.

3.1.1 Affected Environment

For each resource, this section describes the existing pre-project conditions of the environmental resource in the project area. Resources not evaluated in detail are described first, followed by the resources that may be significantly affected by the alternatives.

Although all conditions are subject to some change over time, most of these resources are not expected to change significantly over the 50-year period of analysis for this study. However, any changes expected in the future without project condition are described as part of the No Action Alternative in the Environmental Consequences section. The Analysis of Effects described in the Environmental Consequences sections uses the pre-project condition as its baseline to identify changes to the resource under future with and without project conditions. The baseline environmental conditions assumed in the DSEIS/SEIR for analyzing the effects of the Folsom Dam Raise Project consist of the existing physical environment as of 2014.

3.1.2 Environmental Consequences and Mitigation

In the evaluation of environmental consequences, the conditions described for each resource are compared with future conditions with each alternative plan in place. As appropriate, the effects are discussed either by the alternatives identified in Chapter 2, or for the study as a whole. This is because the effects of several resources are realized over the entire project area rather than limited to a specific part of the project area.

Under NEPA, the effects of the proposed action and alternatives under consideration, including the No Action Alternative, is determined by comparing effects between alternatives and against effects from the No Action Alternative. Under NEPA, the No Action Alternative (i.e., expected future conditions without the project) is the benchmark to which the action alternatives are compared, and the No Action Alternative is compared to existing conditions. Under CEQA, the environmental analysis compares the alternatives under consideration, including the No Project Alternative, to existing conditions as defined at the time when the NOP is prepared. For consistency, in this DSEIS/SEIR it is referred to as the No Action Alternative.

Both adverse and beneficial effects are considered, including direct effects during construction and indirect effects resulting from the alternatives. Each section, where appropriate, contains a discussion of the methods used to analyze effects. In addition, significance criteria for each resource is used to evaluate the level of significance of any adverse effects. Finally, measures are proposed to avoid, minimize, or mitigate (compensate) any significant adverse effects for each resource.

Significant criteria (or “thresholds of significance”) are used to define the level at which an impact would be considered significant in accordance with CEQA. NEPA does not have specific thresholds of significance, and environmental effects are analyzed based on their intensity and duration. Because this DSEIS/SEIR is a joint NEPA/CEQA document, the CEQA thresholds have been applied because they are more stringent. Generally, however, thresholds of significance are consistent with Appendix G of the State CEQA Guidelines, as amended, and NEPA, where defined.

Thresholds may be quantitative and qualitative; they may be based on agency or professional standards, or on legislative or regulatory requirements that are relevant to the impact analysis.

Significance criteria used in this DESIS/SEIR are based on the checklist presented in Appendix G of the State CEQA Guidelines; factual or scientific information and data; and regulatory standards of Federal, State, regional, and local agencies. These thresholds also include the factors taken into account under NEPA to determine the significance of the action in terms of the context and the intensity of its effects.

An environmental document prepared to comply with CEQA must identify the significance of the environmental effects of a proposed project. Therefore, for each effect (impact), a conclusion is provided regarding its significance. A "significant effect on the environment means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affects by the project" (State CEQA Guidelines, 11 Section 15382).

This DSEIS/SEIR uses the following terminology based on CEQA to denote the significance of each environmental effect (impact), and includes consideration of the "context" of the action and the "intensity" (severity) of its effects in accordance with NEPA guidance (40 CFR 1508.27):

No Impact indicated that the construction, operation, and maintenance of the Proposed Action and Action Alternatives would not have any direct or indirect impacts on the environment. It means that no change from existing conditions would result. This impact level does not require mitigation.

Beneficial Impact would result in a beneficial change in the physical environment. This impact does not require mitigation.

Less Than Significant Impact would not result in a substantial or potentially substantial adverse change in the physical environment. This impact level does not require mitigation, even if applicable measures are available under CEQA.

Significant Impact is defined be CEQA Section 21068 as one that would cause "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project." Levels of Significance can vary by alternative based on the setting and the nature of the change in the existing physical condition. Under CEQA, mitigation measures or alternatives to the Proposed Action must be provided, where applicable, to avoid or reduce the magnitude of significant impact.

Potentially Significant Impact is one that if it were to occur, would be considered a significant impact as describe above. However, the occurrence of the impact cannot be immediately determined with certainty. For CEQA purposes, a potentially significant impact is treated as if it were a significant impact. Therefore, under CEQA, mitigation measures or alternatives to the Proposed Action must be provided, where necessary and applicable, to avoid or reduce the magnitude of significant impacts.

An impact may have a level of significance that is **too uncertain to be reasonably determined**, which would be designated too speculative for meaningful consideration, in accordance with State CEQA Guidelines Section 15145. Where some degree of evidence points to the reasonable potential for a significant effect, the DSEIS/SEIR may explain that a determination of significance is uncertain but is still assumed to be "potentially significant" as described above. In other circumstances, after thorough investigation, the determination of significance may still be too speculative to be meaningful. This is an effect for which the degree of significance cannot be determined for specific reasons, such as because aspects of the impact itself are either unpredictable or the severity of consequences cannot be known at this time.

3.2 Resources Not Considered in Detail

Initial evaluation of the effects of construction of the selected alternative indicated that there would likely be little to no direct, indirect, or cumulative effects on several resources. These resources are described in Sections 3.2.1 through 3.2.10 to add to the overall understanding of the environmental setting.

3.2.1 Hydrology and Hydraulics

Hydrology

Surface Water

The American River Basin covers an area of approximately 2,100 square miles, and has an average annual unregulated runoff of 2.7 million acre-feet; however, annual runoff has varied in the past from 900,000 acre-feet to 5,000,000 acre-feet. The major tributaries in the American River system include: the North Fork American River, Middle Fork American River, and South Fork American River. These tributaries drain the upper watershed carrying runoff from precipitation and snowmelt into Folsom Lake (Figure 13).

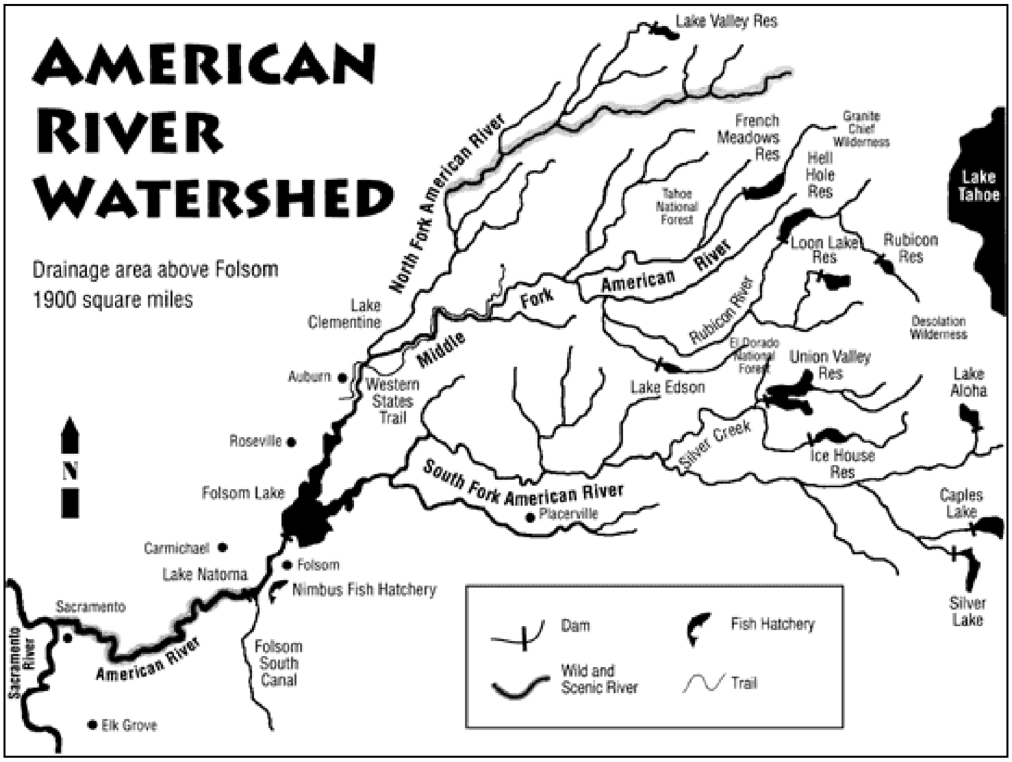

Figure 13. The Hydrology of Folsom Lake, Including Tributaries and Streams.

At an elevation of 466 feet above mean sea level (NGVD 29), Folsom Lake is the principal reservoir on the American River, impounding runoff from a drainage area of approximately 1,875 square miles. Folsom Lake has a normal full-pool storage capacity of approximately 975,000 acre-feet.

Flood-producing runoff occurs primarily during the months of October through April, and is usually most extreme between November and March. From April to July, runoff is primarily generated from snowmelt from the upper portions of the American River watershed. Runoff from snowmelt usually does not result in flood producing flows; however, it is normally adequate to fill Folsom Lake's available storage. Approximately 40 percent of the runoff from the watershed results from snowmelt.

The Lower American River extends 23 miles from Nimbus Dam to the confluence with the Sacramento River. The upper reaches of the Lower American River are unrestricted by levees and are hydrologically controlled by natural bluffs and terraces. Downstream, the river is leveed along its northern and southern banks for approximately 13 miles from the Sacramento River to the Mayhew drain on the south, and to the Carmichael Bluffs on the north.

Water levels would not be impacted during construction on the gates, dams or dikes. Therefore, the construction of any of these alternatives would not alter the hydrology of the

American River nor current reservoir operations. Water would continue to flow through the Basin in the same manner. The project would not substantially alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion, siltation, or flooding on or off site. Therefore, there would be no effect on hydrology due to the spillway tainter gate modification; however, if as a result of the 3.5 foot dam final design, significant adverse effects to hydrology are expected and an appropriate NEPA/CEQA document would be prepared.

Groundwater

Folsom Lake is located at the eastern edge of the Sacramento Valley Groundwater Basin in the North American and South American sub-basins. The area surrounding Folsom Lake consists primarily of bedrock formations of the Sierra Nevada foothill complex.

Ground water is found primarily in fractured geologic formations, and water can be present within the fractured formations. Fractured aquifer systems are typically low yielding; therefore, surface water sources are primarily used for drinking water or irrigation sources rather than wells. Although groundwater is not a major resource in the vicinity of the Folsom site, small amounts of groundwater are typically found in granitic fissures and cracks. Bedrock is close to, or in some areas, at the surface; therefore, high water tables exist in a few locations. Due to the presence of the impermeable material near the surface, natural drainage cannot regularly occur, thus low areas frequently become water-logged.

The Dam Raise Project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. Therefore, there would be no effects to groundwater hydrology with implementation of the project.

Hydraulics

Folsom Dam's current configuration has three general types of outlet structures including: 1) three power penstocks, 2) eight gated outlets (four upper and four lower), and 3) eight spillway gates (five operational service gates and three emergency gates). Reservoir releases are restricted by both the capacity of the discharge structures and by regulatory limits on the increases in release rates. The maximum capacity of the low-level outlets is 34,000 cfs (8,000 cfs total capacity through the three power penstocks and 26,000 cfs maximum total capacity through the eight gated river outlets).

During a flood event, releases are made through the low-level outlets until water levels in the reservoir reach the spillway crest and releases can be made from the main spillway gates. Once water is above the spillway crest, releases can then be raised incrementally to 115,000 cfs (design release), which represents the maximum safe carrying capacity of the lower American

River. The maximum rate of increase in flows is limited to 15,000 cfs per hour until outflow reaches 115,000 cfs. As inflows continue to increase, more water is released from the spillways to protect the dam. A maximum of 160,000 cfs can be released on a limited emergency basis without causing a downstream levee failure and flooding in the Sacramento area. The three emergency spillway gates may not be used unless the total outflow from the dam exceeds 300,000 cfs. This restriction makes the emergency gates unusable for normal flood management purposes and limits the use of the gates to dam safety outflows.

The JFP auxiliary spillway, under construction through 2017, would provide additional flood risk management benefits for Folsom Lake (the maximum discharge capacity of the newly constructed auxiliary spillway is approximately 312,000 cfs). The Water Control Manual (WCM) is currently being updated to take advantage of the additional release capabilities that the JFP would provide in 2017, the effects of which would be analyzed in a subsequent NEPA/CEQA document.

This DSEIS/SEIR focuses on effects associated with construction of the selected alternative. Because there would be no initial changes to the operation of Folsom Lake in this initial construction effort, impacts to hydraulics during the construction of the Dam Raise would be negligible. A subsequent WCM update would occur to take into account changes in operations due to additional capabilities of the Dam Raise; this would include appropriate NEPA/CEQA documentation.

3.2.2 Hydropower

The CVP hydropower system consists of eight power plants and two pumping-generating plants. This system is fully integrated into the Northern California Power System and provides a significant portion of the hydropower available for use in Northern and Central California. The installed power capacity of the system is 2,044,350 kilowatts (kW). By comparison, the combined capacity of the 368 operational hydropower plants in California is 12,866,000 kW. Pacific Gas and Electric Company (PG&E) is the area’s major power supplier with a generating capacity from all sources of over 20 million kW.

The Folsom power plant has three generating units with a total generating capacity of 196.72 megawatts (MW), and a release capacity of approximately 8,600 cfs. By design, the facility is operated as a peaking facility. Peaking plants schedule the daily water release volume during the peak electrical demand hours to maximize generation at the time of greatest need. At other hours during the day, there may be no release (and no power generation) from the plant.

The construction of the Folsom Dam Raise would have no effect on the ability of Folsom Dam to generate hydropower. The project would not change any water diversions that can affect power generation.

3.2.3 Water Supply

Folsom Lake is operated as part of the CVP for many purposes, including water supply. The reservoir meets the majority of water demands for the City of Roseville, the City of Folsom, the San Juan Water District, and Folsom Prison. The San Juan Water District provides water to the City of Folsom, Orangevale Water Company, Fair Oaks Water District, and Citrus Heights Water District. Placer County Water Agency and El Dorado Irrigation District also receive water from Folsom Lake (USBR 2005).

Folsom Lake provides water through a diversion at Folsom Dam to the cities of Folsom and Roseville, the San Juan Water District, and Folsom State Prison. An 84-inch pipeline, which is part of the North Fork distribution system, passes through the right abutment of the dam, providing water to the City of Roseville and San Juan Water District. A second 42-inch pipeline, which is part of the Natoma distribution system or Natoma Pipeline, passes through the left abutment. Water is conveyed from the Natoma Pipeline to the City of Folsom and California Department of Corrections water treatment plants, and the Corps' Resident Office Fire Protection System.

The Dam Raise Project would have no effect on groundwater supplies or interfere substantially with groundwater recharge. The project design, such as having concrete floodwalls on the Left and Right Wing Dams, was designed to avoid any impact to the Natoma Water Line. Thus, water allocations and the timing of deliveries would not be impacted by the construction of the proposed alternative. However, while it is expected that operation of the dam raise features would have no effect on water supply, effects related to a change in reservoir operations as a result of the dam raise would be investigated in a subsequent analysis.

3.2.4 Fisheries and Aquatic Resources

Native and introduced fishes are present in the Folsom Lake area. Native fishes occur primarily as a result of their continued existence in the tributaries of Folsom Lake and Lake Natoma. Two native species are planted in Folsom Lake for fishing, rainbow trout and Chinook salmon. The populations of most other species are currently self-supporting. Introduced fishes are more commonly found in the reservoirs than are native fishes. Most of these fishes were introduced into the State as game fish or as forage fish to support game fish populations.

No work would occur in a wet or aquatic environment, and there would be no interference with the movement of migratory fish. Therefore, the proposed action is not expected to affect fishery or aquatic resources. As part of standard construction practices, the contractor would be required to develop and submit a Storm Water Pollution Prevention Plan (SWPPP) and a Spill Preventions and Countermeasure Plan (SPCP) prior to initiating construction activities to minimize the potential for soil or other contaminants to enter the river. The SWPPP and SPCP must be approved by the Corps.

No materials would be discharged into Folsom Lake or the American River. Water trucks would be used for dust suppression along all areas of disturbed soil and along the haul routes; trucks would be monitored so over watering and runoff does not occur. The contractor would not be allowed to store fuels, lubricants, or other potential hazardous substances onsite. If equipment is to be refueled onsite, BMPs would be used to avoid and contain any possible spills. Although no adverse effects to fisheries or aquatic resources are expected, the SWPPP and SPCP in place ensures that this project would have no effect; therefore, impacts would be considered less than significant.

3.2.5 Geology, Mineral Resources, Seismicity, and Soils

The project area is between the Central Sierra Nevada and the Central Valley Geomorphic Provinces. The Sierra Nevada geomorphic region is characterized by a north-northwest trending mountain belt with extensive foothills on the western slope. The Folsom Lake geomorphic region primarily consists of rolling hills and upland plateaus between major river canyons. There are three major geologic divisions within the study area. The oldest consists of a north-northwest trending belt of metamorphic rocks. Younger granitic plutons have intruded and obliterated some of the metamorphic belt. The youngest geologic division consists of relatively flat deposits of volcanic ash, debris flows, and alluvial fan deposits. These deposits overlie the older rocks.

Igneous, metamorphic, and sedimentary rock types are present within the project area. The four major rock divisions of the project area include 1) ultramafic intrusive rocks, 2) metamorphics, 3) granodiorite intrusive rocks, and 4) volcanic mud flows and alluvial deposits.

The project area is within the Foothills Fault system, which is located in the metamorphic belt. This system consists of northwest trending vertical faults and is divided into two zones, the western Melones Fault zone and the western Bear Mountains Fault zone. The west trace of the Bear Mountains Fault zone transects the upper reaches of the North Fork arm near Manhattan Bar Road, and crosses the South Fork arm in the region of New York Creek.

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called surface faulting. No active faults have been mapped within the project area by the California Geological Survey or U.S. Geological Survey (Jennings, 1994). The project area is not located within the Alquist-Priolo Earthquake Fault Zones, and therefore the Alquist-Priolo Earthquake Fault Zoning Act does not apply to this project (California Geological Survey, 2007). The risk of fault ground rupture is negligible in the project area (Knudsen, et al. 2008).

The dikes throughout the project site were constructed in the mid-1950s. Each dike was constructed as a zoned embankment with a silty sand (SM) core of approximately 30% fines, and a silty sand (SM) embankment shell with a fines content of <30%, or less than that of the core material. This construction also included a coarse gravel blanket drain at the downstream toe. The foundation is hard, moderate to highly weathered granite. The slope protection materials consist of rock riprap underlain by a coarse filter primarily consisting of 3-inch minus dredge tailings, and a fine filter material of 2-inch minus sands and gravels placed in 1 foot layers. Additionally, USBR has recently (2007 through 2015) conducted dam safety improvements on Dikes 4, 5, 6, the Wing Dams, and MIAD. These include modification to the sand filters, toe drains, and the berms to mitigate against seismic and seepage concerns.

To ensure public safety, proposed new levees, other flood control facilities, and proposed modifications to existing flood control facilities would be designed to withstand the maximum earthquake and associated ground failures (EM 1110-2-2104, 2105, ER 1110-2-1806). Therefore, there would be no project-related effects to geology and or seismicity-related effects because flood control improvements would be designed to withstand ground shaking and associated ground failures. The project would not result in the loss of availability of a known mineral resource of value to the region. Therefore, there would be no adverse effects to mineral resources due to the project. The project is not located on expansive soil that can cause significant damage to or disruption of engineered utilities or structures, and would not result in soil erosion or the loss of topsoil. Although the dikes would be disturbed during construction of the 3.5-foot raise, the soil and road would be restored upon completion of the project.

3.2.6 Land Use and Planning

The land surrounding Folsom Dam and Reservoir is primarily Federally-owned and designated for recreation and flood control use. The major land use in the project area is USBR's Central California Area Office and the Folsom Dam industrial complex, along with a utility corridor. Additionally, residences on the southwestern perimeter of the reservoir near Granite Bay are located between 600 and 1,200 feet of Dikes 1 through 6. There are a few residences within 1,000 feet of the RWD, but none within the same distance of the LWD. On the southeastern perimeter of the reservoir, some residences are located within 400 feet of Dikes 7 and 8. The closest residences to MIAD are located approximately 1,200 feet away off Green Valley Road.

State Parks, under an agreement with USBR, manages Folsom Lake, Lake Natoma, and adjacent lands designated as the Folsom Lake State Recreation Area (FLSRA). Most of the project area is designated as part of the FLSRA; however, the lands directly surrounding the project area are closed to the public. As part of the FLSRA, a portion of the American River bicycle, pedestrian, and equestrian trail is located adjacent to the project area.

Adjacent to the project area is a portion of the California State Prison, Sacramento. This multi-mission institution consists of about 1,200 acres located on Prison Road. California's second oldest prison, Folsom State Prison, is located at 300 Prison Road on a 40-acre parcel adjacent to and south of Folsom Dam. Both prisons collectively house nearly 8,000 inmates, the Regional Corporation Yard for Inmate Day Labor, and the main headquarters for the Prison Industry Authority. The prison property includes access to the Sacramento-Folsom firing range, office and storage facilities, and the Green Valley Conservation Camp.

The land located west of the project area is within the City of Folsom and is zoned as an Open Space Conservation District. This zoning district was established to maintain these properties as open or undeveloped, or developed as permanent open uses such as parks or greenbelts. This zoning district also includes Folsom State Prison. East of the prison, the land is zoned as an Agricultural Reserve District. This area provides a buffer between Folsom Lake and developed areas to the south. This zoning district is intended to provide for interim agricultural and livestock grazing uses until community services are available for urban development (Reclamation 2006). The designated land zones within and adjacent to project area would remain unchanged after implementation of the selected alternative.

To access Dikes 1 through 3, construction vehicles will possibly use the park entrance at the concurrence of Douglas Blvd and Park Road (Folsom Lake Park/Granite Point). This impact to residential areas is temporary and less than significant. The land use in and around the project area, including the recreation and prison lands, would not change as a result of construction of the Dam Raise Project. The project would not physically divide an established community or conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project area. There would be no conflict with any applicable conservation plans or natural community conservation plans. Therefore, there would be no effect to land use as a result of the project.

3.2.7 Agriculture and Forestry Resources

There is no farmland or forestry land within the project area. Therefore, there would be no adverse effects on agricultural and forestry resources.

3.2.8 Socioeconomics

The City of Folsom is within Sacramento County, approximately 25 miles east of downtown Sacramento on Highway 50. The U.S. Census Bureau reports that the population of Folsom was 76,375 in 2015, which was a population growth of approximately 5.8% since the 2010 Census. The population of Folsom is approximately 74% white, 12% Asian, 6% African American, 0.6% Native American, and 0.2% Pacific Islander, with the remaining percentages classified as other or more than one race (Census 2015). People of Hispanic origin make up approximately 11% of the city's population. It is important to note that these estimates may not be accurate because the U.S. Census Bureau only updates population data every ten years, and the next update will not be until the year 2020.

The labor force in the City of Folsom was 35,487 people in May 2016, with an unemployment rate of 3.10%.. The city's unemployment rate is well below the unemployment rate for the Sacramento – Roseville – Arden-Arcade Metropolitan area at 4.7% during the same time period (EDD 2016). The median family income in the City of Folsom from the years 2010 through 2014 was $100,163, and the per capita income is $38,472 (Census 2015). Employment opportunities near the project area include technology, food manufacturers, retail, health care, and education (City of Folsom 2011).

No actions associated with the project would limit either current or future opportunities for agriculture, business, employment, or housing. While there are residents located adjacent to the project area, these populations do not comprise a substantial population of minorities. No populations would be displaced as a result of project construction, and no local industry would be disrupted by project activities. There would be no disproportionately adverse effects to minorities or low-income populations. Therefore, socioeconomics is not evaluated further in this DSEIS/SEIR.

3.2.9 Population and Housing

Although there are no homes located directly within the project footprint, there are several residences near the construction areas. Residences on the southwestern perimeter of the reservoir near Granite Bay are located between 600 and 1,200 feet of Dikes 1 through 6. There are a few residences within 1,000 feet of the RWD, but none within the same distance of the

LWD. On the southeastern perimeter of the reservoir, some residences are located within 400 feet of Dikes 7 and 8. The closest residences to MIAD are located approximately 1,200 feet away off Green Valley Road.

Because no existing housing is within the project area, the Dam Raise Project would not displace any existing housing or people, necessitating the construction of replacement housing elsewhere. The Dam Raise would not cause population growth in the nearby area, either directly or indirectly. Therefore, there would be no effects to population and/or housing.

3.2.10 Public Utilities and Services

Electric utilities near the project area include Sacramento Metropolitan Utility District (SMUD), Pacific Gas and Electric (PG&E), and Western Area Power Administration (WAPA) lines and facilities. SMUD owns and operates the Folsom-Elverta 230-kilovolt (kV) transmission line that runs along the northern boundary of Folsom Prison and carries electricity from the Upper American River Project facilities, to the Lake Folsom Transmission Line, and then to the Orangeville Transmission Line. The Folsom-Elverta transmission line also connects the SMUD grid, a component of the Sacramento County electrical system. The utility corridor north of the prison is considered a building-restricted area and does not permit certain uses incompatible with the safety, operation, maintenance, and construction of the transmission line facility. PG&E's only transmission line within the project area is the Halsey Junction-Newark 115 kV line. Additionally, WAPA has a 15-kilovolt Folsom-Nimbus transmission line and associated fiber optic link within the project area. No natural gas infrastructure or facilities exist within the project area.

Modifications to the wing dams and dikes could disrupt buried and aerial utilities including sewage, water, gas, electric, telephone, and cable lines. Severing any of these lines can result in substantial disruption to services provided by the utilities. Prior to initiating ground disturbing activities, the contractor would coordinate with Underground Service Alert to insure that all underground utilities are identified and marked. All utilities would be protected in place and no disruption of service is expected. If for any reason utilities would require a disruption in service, residents and businesses within the potentially affected area would be given notice of the anticipated time and duration of the disruption before the start of construction.

Wastewater services would not be disrupted as a result of the construction of this project, and no additional wastewater facilities would need to be constructed to deal with any project water discharges. No additional water supply or landfill resources are needed to support the project. The Dam Raise Project complies with federal, state, and local statutes and regulations related to solid waste.

At the current level of design, construction would not access or realign the existing potable water supply, sanitary sewerage, or storm sewer systems. Existing haul routes would be used by construction vehicles to avoid overloading public roadways and causing delays to public services. Therefore would be no effects to public utilities or services as a result of project construction.

3.2.11 Hazardous, Toxic, and Radioactive Waste

A Phase I Environmental Site Assessment (Phase I) was conducted in accordance with ASTM E1527-13 guidance. The Phase I did not identify any HTRW sites located at the project area; however, due to historical mining activities, the project has the potential to contact contaminated groundwater and soil. Elevated levels of arsenic have been detected in the groundwater adjacent to MIAD.

Dredge tailings from placer mining in the area were used in the construction of the dikes, a slope protection, and riprap bedding. Placer mine tailings do not typically contain elevated levels of HTRW, and do not represent an environmental impact if disturbed.

During construction, there is potential for hazardous materials such as fuels, oils, or paints to be accidentally spilled or released into the environment. Prior to construction, a hazardous materials management plan would be prepared and implemented. The plan would include measures to reduce the potential for spills of toxic chemicals and other hazardous materials during construction. The plan would also describe a specific protocol for the proper handling and disposal of these hazardous materials, as well as contingency procedures to follow in the event of an accidental spill.

As a result, construction of the project is not expected to result in any adverse effects due to HTRW. If any HTRW sites are identified during construction, appropriate response activities would be conducted to prevent potential adverse effects. Lead is assumed present in all underlying primer on the dam structure and is further addressed in Section 3.11, Water Quality.

The construction of the Dam Raise Project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or release of hazardous materials into the environment. It would not interfere with any emergency response or evacuation plans. The project would not expose nearby schools or other sensitive receptors to hazardous emissions or materials. It is not located on a hazardous materials site that would create a significant hazard to the public or the environment. Therefore, the Dam Raise Project would not result in adverse effects to HTRW resources or to the public.

3.2.12 Public Safety

The construction of the Dam Raise Project would not create a significant hazard to the public or the environment through interference with any emergency response or evacuation plans. The project would not expose nearby schools or other sensitive receptors to hazardous emissions or materials. The Dam Raise Project would not increase the risk of wildland fires that would expose people or structures to a significant risk of loss, injury, or death. Therefore, the construction of the Dam Raise Project would little to no effect effect on public safety.

3.3 Recreation

3.3.1 Environmental Setting

The Folsom Lake State Recreation Area (FLSRA) is an important local, regional, and state recreation resource. Figure 14 shows recreation area features in conjunction with the Dam Raise Project dikes and wing dams. With an average of 1.5 million average annual visitors, the FLSRA is one of the most popular sites within California for recreation in the State Parks system (State Parks and USBR 2007). The popularity of FLSRA is largely due to easy public access, being located next to a growing metropolitan area, and opportunities for year-round use. Recreational uses include water-based activities and land-based activities.

Water-based activities account for approximately 85 percent of all visits to the FLSRA (State Parks and USBR 2007a) and include boating, personal water craft use, water skiing, wake boarding, sailing, windsurfing, swimming, and fishing. The remaining 15 percent of visitors participate in a variety of land-based activities, such as hiking, biking, picnicking, camping, and horseback riding. Approximately 75 percent of users visit the FSLRA during the warmer spring and summer months. State Parks obtains revenue from use fees paid by the public, and rental fees associated with concession operations in the FLSRA. FLSRA spans across three counties (El Dorado, Placer, and Sacramento), as well as the City of Folsom.

There are three campgrounds in the FLSRA providing a total of 176 campsites that accommodate tent, trailer, RV, and group camping. Peninsula campground includes 104 family campsites. Negro Bar campground is comprised of three reservation-only group campsites, two of which are designed to accommodate 50 people with the third site designed to accommodate 25 people. Beal's Point campground includes 49 family campsites and 20 RV sites with full hookups, sanitary dump station, three restrooms, and two shower buildings. The RV sites were constructed as mitigation for the loss of the family campsites at Negro Bar that were removed for the construction of the Lake Natoma crossing. Campers have easy access to all of the day use facilities provided at Beal's Point, including trails, the beach, picnic area, and snack bar. Full capacity is often reached at all three campgrounds during the peak season.

There are 94 miles of existing trails within the FLSRA (Figures 12 and 13). Currently, there are 46 miles of pedestrian/equestrian trails, 20 miles of multi-use trails, 16 miles of Class 1 paved trails, 9 miles of mountain bike/pedestrian trails, and 3 miles of pedestrian-only trails, of which 2 miles are ADA accessible. Trails connect Folsom Lake to Lake Natoma and the Auburn State Recreation Area. There is not a continuous trail connection around Folsom Lake.

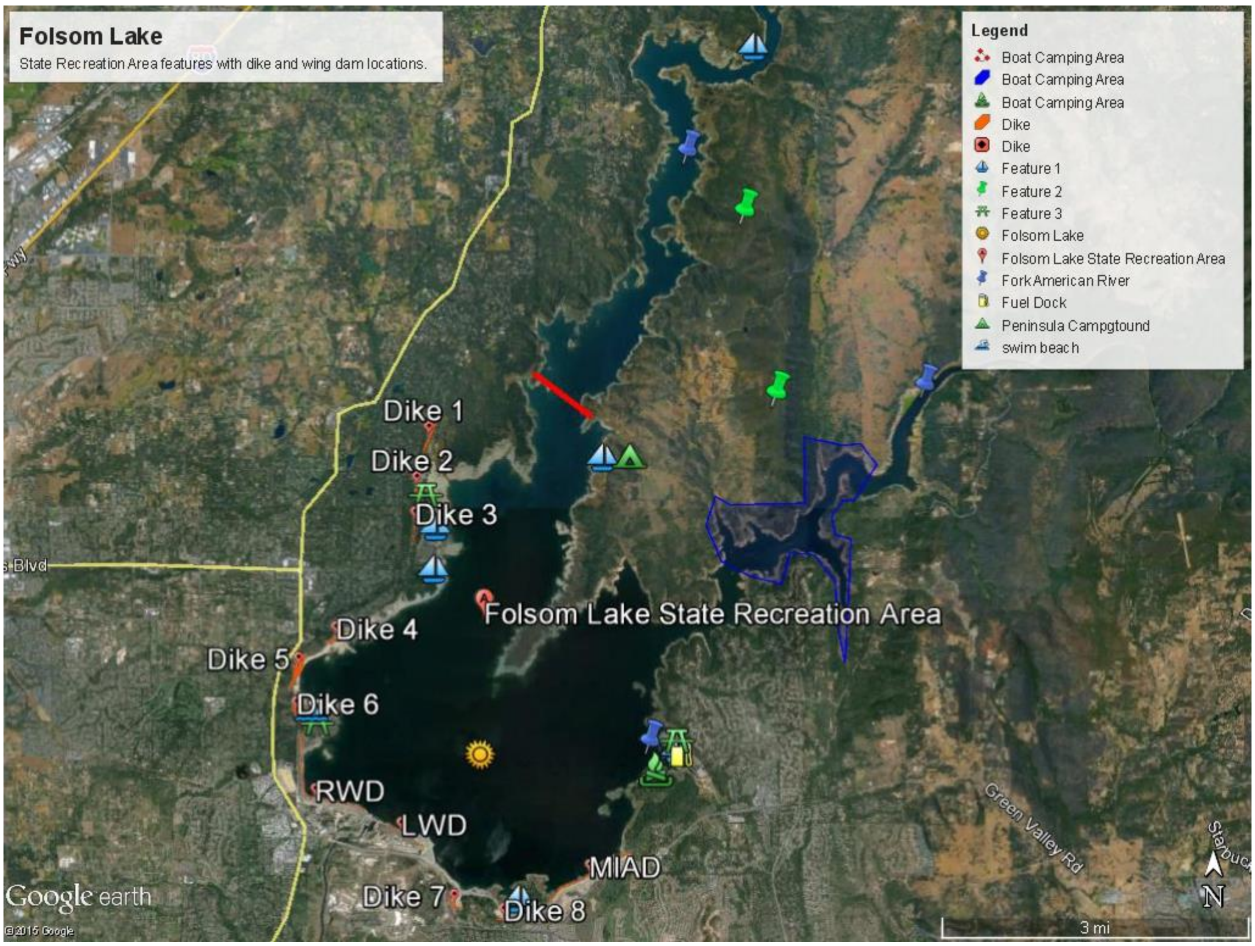

Figure 14. Folsom Lake State Recreation Area General Features, Associated with the Dikes and Wing Dams of Folsom Dam. Area above the red line and within the blue line denotes boat camping areas.

Granite Bay and Beal's Point are the primary visitor areas on the western shoreline of Folsom Lake. On the eastern shoreline, Brown's Ravine and Folsom Point are the primary visitor areas.

Granite Bay. Granite Bay is the most popular day use facility within the FLSRA. Annual attendance in 2011 was 499,630 visitors. Facilities include picnic areas; a guarded swim beach for summer use; informal unguarded swim areas; equestrian staging area; hiking trails including an Americans with Disabilities Act (ADA) accessible trail, a pedestrian only trail; parking; two reservable group picnic sites; and fishing and boating. There are also restrooms and bicycle/pedestrian trails. The boat launch area capacity varies with water levels. Dependent upon water levels, a maximum of 20 lanes of boat launch are available. Concessions in the area include a snack bar and beach equipment rentals, boat and personal watercraft rentals, equestrian trail rides, fitness training, and vessel repair and tow services.

The North Granite area is popular for fishing, horseback riding, and mountain biking and hiking. This area includes an informal beach area at Oak Point, an equestrian staging area, Doton's Point, and Beeks Bight. An activity center just north of the launch ramps is available by reservation for group use and includes a picnic area.

Trail facilities at Granite Bay include the equestrian and pedestrian Pioneer Express Trail running north to Auburn State Recreation Area, 8 miles of unpaved multi-use trails running through the area, and an unpaved ADA assessable, pedestrian only trail in the Beeks Bight area.

As with Beal's Point, capacity is a major concern at Granite Bay, particularly during peak season weekends when the day use parking area at Main Beach and the parking areas at the launch ramps fill by midday. There is only one entrance to Granite Bay at Douglas Boulevard, and significant backups occur along the roadway and onto Auburn-Folsom Road when the parking areas fill.

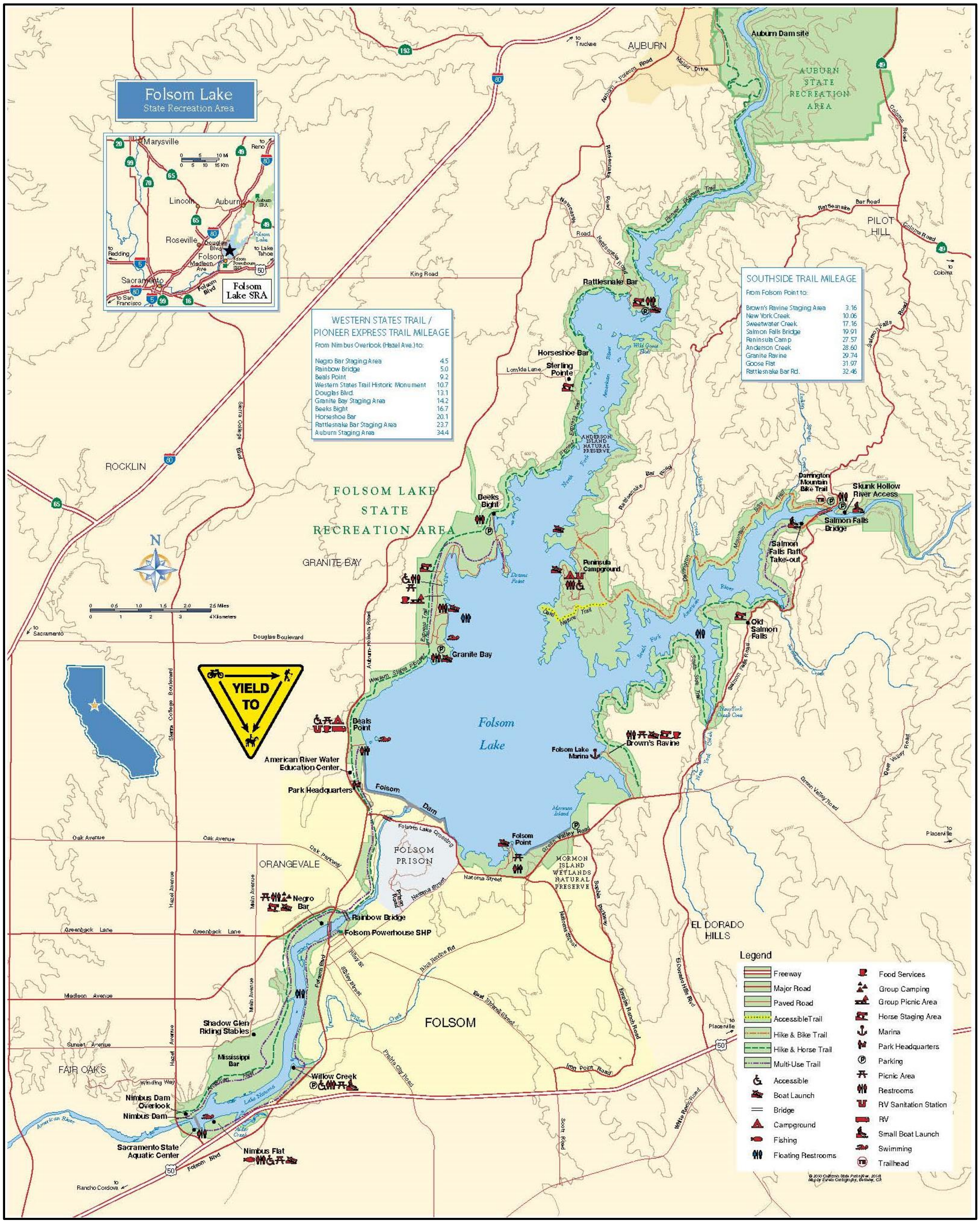

Figure 15. Recreational Trail System within the Folsom Lake State Recreation Area (Folsom Lake State Recreation Area, 2015).

In addition, there is no external access to the sprawling and relatively remote North Granite area. Unrestricted vehicle access along the shoreline at low water is also a concern. Unrestricted vehicle access causes erosion, potentially impacts water quality, damages vegetation, and threatens cultural resources below the high water line.

Maximum usable elevation of the boat launches areas range from about 360 feet to 470 feet. When the reservoir surface level is at 466 feet, a 16-lane ramp and a 4-lane ramp are usable. Elevations of the structures (other than the boat launch ramps), parking lot, and roads at Granite Bay range from approximately 465 feet to 475 feet.

Beal's Point. Beal's Point includes day use facilities and a campground. Annual attendance in 2011 was 244,148 visitors. Facilities include a guarded swim beach for summer use, parking for approximately 400 vehicles, hiking trails, picnic areas, and campsites. Concessions include a snack bar and beach equipment rentals. A large grassy area along the reservoir includes picnic tables, barbeques, and restroom facilities.

The paved multi-use Jedediah Smith Memorial Trail begins at Beal's Point and connects to Lake Natoma and the American River Parkway. The unpaved multi-use Granite Bay Trail connects Beal's Point to other facilities along Folsom Lake.

During peak season weekends, the parking area generally fills by midday, causing traffic to back up onto Auburn-Folsom Road and surrounding neighborhood streets. This also makes it difficult for campers with reservations to enter the FLSRA.

The structures, parking lot, and roads at Beal's Point range in elevation from 465 feet to 475 feet. When the reservoir surface level reaches 466 feet, water levels are just below the road, parking lot, restrooms/dressing room building, and concessions building. At 466 feet, the beach area would be inundated, although turf areas for picnicking, sunbathing, and other passive uses are still usable.

Brown's Ravine. Brown's Ravine is home to the Folsom Lake Marina which provides 675 wet slips, 175 dry storage spaces, boat launch facilities, marine provisions, pump-a-head station, a fueling station, a small picnic area, and restrooms. The Brown's Ravine Trail is an unpaved multi-use trail that extends four miles between Folsom Point and Brown's Ravine. The trail begins in the day use area at Folsom Point and ends at the Brown's Ravine. The equestrian/pedestrian Browns Ravine/Old Salmon Falls Trail begins at Browns Ravine and extends twelve miles to Old Salmon Falls.

Folsom Point. Folsom Point, located off East Natoma Street, is the most popular day use area on the Folsom Lake eastern shore. Attendance in 2011 from April through September was

85,917 visitors. Facilities include a picnic area with parking for 77 vehicles, and the largest formal boat launch area on the east side of the lake with parking for 121 vehicles with trailers. The maximum usable boat ramp elevation at Folsom Point is 468 feet with a minimum of approximately 405 feet. Aquatic and day use facilities quickly reach capacity during peak season weekends as it is a popular site for staging special aquatic events. During the summer, California State University, Sacramento (CSUS) utilizes Folsom Point at Folsom Lake for their youth wake board and water ski camp.

3.3.2 Environmental Consequences

Methodology

The FLSRA supports a diverse range of outdoor recreation activities and opportunities. Impacts to recreational opportunities within the project area are evaluated based on temporary and permanent changes to those resources that would occur during implementation of the project. In making a determination of the extent and implications of recreational changes, consideration was given to:

- The closure or reduced public availability to recreational sites and access points;

- Truck traffic and construction activities interfering with recreation activities and access points;

- Requirements for the construction or expansion of recreational facilities; and

- Potential receptors in the area include staff, day use recreationist, campers, boaters and other water based recreationists. All recreational groups were taken into account during analysis of impacts.

Basis of Significance

Effects to recreational resources are considered significant if construction would:

- Substantially restrict or reduce the availability or quality of existing recreational facilities and opportunities in the project vicinity; or

- Displaced recreation from sites affected by construction would substantially contribute to overcrowding or exceed the facility capacity at other recreational sites (including sites within the FLSRA).

3.3.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Dam Raise would not be constructed. Therefore, the project would not disturb existing recreational opportunities. The conditions at FLSRA would remain similar to existing conditions. The public would have continued use of the FLSRA without any closures or access restrictions.

3.3.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall

Under this alternative, there would be no effects to recreational opportunities due to the modification of the spillway gates, as this portion of the project area is not open to public access. Staging areas are on Reclamation's work yard just south of the RWD, and site access is off Folsom-Auburn Road through Reclamation's Central California Area Office (CCAO), both of which are not accessible to the public.

The implementation of Alternative 2 would not eliminate or severely restrict access to recreational facilities or resources, or result in substantial disruption to the use of an existing recreation facility. It would not have any significant effect on any nearby parks or require construction or expansion of recreational facilities. Therefore, the construction of the tainter gates and the modification of the spillway gates would not have an impact on these recreation resources.

During the construction of the 3.5-foot raise, access to the northern half of the Granite Bay State Park is via Park Road, a paved, two-lane road that runs across the crest of Dikes 1 through 3. Park Road would be closed for up to 2 years during construction. A detour for vehicles and pedestrian traffic would be established near Dikes 1 through 3. At the conclusion of construction, the detour would be removed and the area restored to pre-project conditions. Potential detours (Figure 16) would be determined prior to construction and discussed in further detail in subsequent environmental document, if needed. The location of detours will take into account the lake water level, the ease of signage and relation of information to the public, the potential impact on already heavily used parking lots, and emergency access issues.

Figure 16. Potential Dike 1 Vehicle Detour.

The trails on the tops of Dikes 4, 5, and 6 are heavily utilized by pedestrians, bicyclists, and equestrians. These trails would be closed to the public for up to 2 years for the duration of construction of the earthen embankment raise. Bicycle detours are currently in place that allow for continuous use of trails around the dikes during construction (Figure 17).

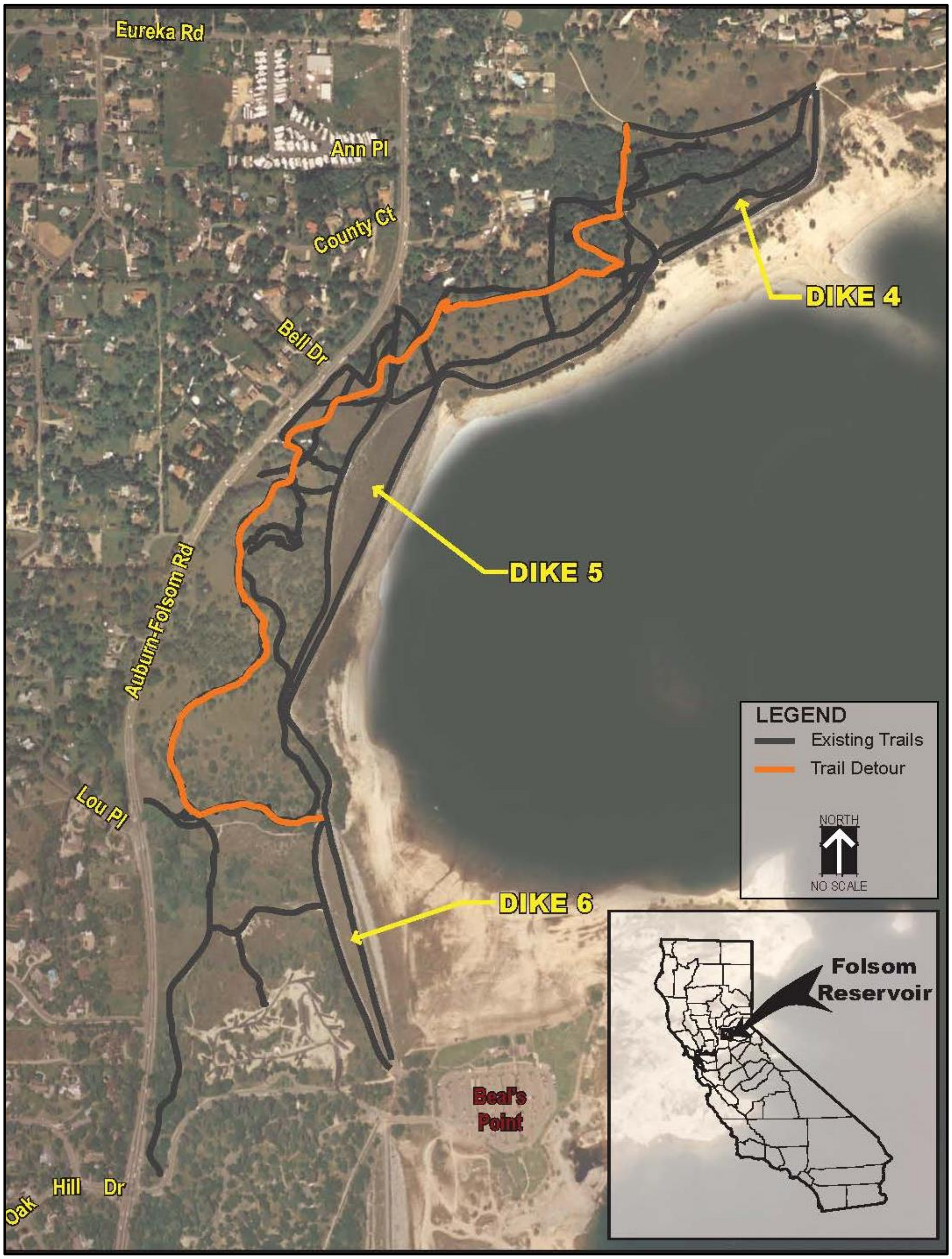

Figure 17. Potential Trail Detour for Dikes 4, 5, and 6.

Dikes 7 and 8, and MIAD, would be closed for up to 2 years during construction. A trail detour currently exists at MIAD, and this trail would remain accessible during construction (Figure 18) given that the access would provide reasonable pedestrian and equestrian access to Folsom Point. This detour area is not impacted by other, concurrent projects such as the widening of the Green Valley Road.

Figure 18. The Current MIAD Bike Trail Detour.

If there are such issues, another detour would be proposed and assessed prior to construction. As there is no access for vehicles or the general public at Dikes 7 and 8, a detour would not need to be established. A concrete floodwall on the top of the LWD and RWD would have no impact to recreation because these areas are not publically accessible. Construction duration of the floodwall would be up to one year.

Folsom Point may be used for construction access to MIAD and Dikes 7 and 8, but it would remain publically accessible during construction with the use of proper signage and public education. The Brown’s Ravine recreational area and trails are adjacent to a potential access point for MIAD at Sophia Parkway. If this potential access point is used, trail detours would be established. Use of these access points would be temporary. Beal’s Point would not be used for access.

Because trail detours would be maintained or established as necessary, it is unlikely that the project would increase the use of other nearby recreational facilities to the point that substantial physical deteriorations of the facilities would occur or accelerate. It is also unlikely that trail detours would have a significant adverse effect on the surrounding environment.

With the exception of the tops of the dikes and dams, as well as the staging areas, all existing recreational areas near the construction area would remain accessible to the public.

Because of the trail detours and other recreational opportunities in the area, it is assumed that the majority of the recreation activity would not change and that most recreation users would continue to visit the FLSRA and use the trails. Once construction has been completed, the tops of the dikes would again become publically accessible.

The direct effects to recreation as a result of the implementation of this alternative are considered significant because it would result in a severe restriction to recreational facilities and resources due to a substantial, long-term disruption of existing recreation facility usage. All trails in the FLSRA, including those on Dikes 1 through 6 and MIAD, are used extensively throughout the seasons. Existing trails on Dikes 1 through 6 and MIAD accommodate pedestrian, bicycle, and equestrian users. Additionally, these trails are approximately 20 feet wide and allow for a large number of people to use them at once. Although trail detours would be accessible, these detours would not offer the same level of service as the paved roads on the tops of the dikes and dams, and are not suitable for all types of recreation users. This would lead to both direct and indirect effects to those users who might choose to no longer recreate on the trails. Additionally, the creation of new trails would have the potential to cause adverse physical effects on the environment. Some trail users may decide to make their own trails or use trails not designated for their type of recreation. This can lead to both direct and indirect effects due to environmental impacts and may cause conflicts on existing trails leading to a potential increase of calls for service by the State Park Rangers, or the increased chance of accidents on unsanctioned trails.

3.3.5 Avoidance, Minimization, and Mitigation Measures

Although contractor staging would emphasize use of areas with no current public access and away from residential areas, there may be temporary impacts to recreation access. In an attempt to maintain as much public access to recreation areas and trails throughout the construction period as possible, traffic control measures, grade separated vehicular and/or pedestrian crossings, security fencing, and/or temporary alternate public access detours for pedestrian, equestrian, bicycle, and vehicular traffic would be used.

To ensure public safety, warning signs and signs restricting access would be posted before and during construction as necessary. Public outreach would be conducted through mailings, posting signs, coordination with interested groups, and meetings, if necessary, in order to provide information regarding changes to recreational access in and around Folsom Lake. The detours, traffic control measures, access restrictions, increased signage, increased education, and public outreach would help mitigate effects to recreational users of the FLSRA. The effects are expected to be less than significant, however, significant effects could remain even with mitigation, avoidance, and minimization measures in place. Once the detour routes are identified, an analysis of potential impacts would be completed and, if needed, included in a supplemental environmental document.

3.4 Vegetation and Wildlife

3.4.1 Environmental Setting

Regulatory Setting

The following Federal, State and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations can be found in Chapter 5.0.

Federal

- Executive Order 13112, Invasive Species
- Fish and Wildlife Coordination Act (FWCA) (16 USA §§661 – 667e)
- Migratory Bird Treaty Act (16 USC §§703-712)

Local

- Sacramento County Ordinance, Chapter 19.12, Tree Preservation and Protection

This ordinance regulates the removal or disturbance to all species of oak trees native to Sacramento County. These species include valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), blue oak (*Quercus douglasii*), oracle oak (*Quercus x moreha*), and black oak (*Quercus kelloggii*). The ordinance applies to any native oak tree. Typically, only trees 6 inches in diameter at breast height (dbh), or greater, are protected.

Existing Conditions

Vegetation and Wildlife

This section describes the existing vegetation and wildlife resources in the project area. This description is based on field visits and a review of pertinent literature, and gathered in coordination with the U.S. Fish and Wildlife Service (FWS) in accordance with the Fish and Wildlife Coordination Act.

The project area currently supports the following habitat types: oak woodland, riparian woodland, seasonal wetland, chaparral, and annual grassland. In addition, developed areas are present and may be devoid of vegetation or host non-native grasses and ruderal vegetation in construction staging and material storage sites in the project area.

The Folsom Dam Raise Project footprint is dominated by annual grassland habitat (approximately fifty acres) as well as stands of oak woodland (approximately five acres) with scattered oak/pine woodland. Smaller areas (less than one acre each) of riparian woodland and seasonal wetlands are found within the project footprint. More specifically, the northern portion of the project area is predominantly oak woodland with pine, and the southern portion is characterized by larger annual grassland acreages situated among stands of oak and scattered pine woodland. In addition, urban/developed areas, Chaparral, as well as Lacustrine (open water), and Riverine habitat also occur within the project area.

Oak Woodland and Oak/Pine Woodland

Oak woodland and oak/pine woodland is the largest woodland acreage affected by the project. Oak and oak/pine woodland is characterized by various oak species and a single pine species. Tree canopy cover is continuous, intermittent, or savanna-like with grassy understories.

The understory shrub layer is usually sparse to intermittent, and can include species such as Mexican elderberry (*Sambucus Mexicana*), California buckeye (*Aesculus californicus*), Pacific poison oak (*Toxicodendron diversilobum*), and wedgeleaf ceanothus (*Ceanothus cuneatus*). However, mesic soils under valley oaks can contribute to a dense herbaceous understory and an increase in understory herbaceous layers. This lower tree canopy cover includes non-native grass species such as cheat grass (*Bromus diandrus*), slender oat (*Avena barbata*), soft chess (*Bromus hordeaceus*), and Italian thistle (*Carduus pycnocephalus*) (CNPS 2015). Other ruderal species include shortpod mustard (*Hirschfeldia* incana), telegraph weed (*Heterotheca grandiflora*), and yellow starthistle (*Centaurea solstitialis*). Bare ground or leaf litter is predominant in areas of dense tree cover.

In project areas where pine comprised a two to eight percent crown cover with oak, it was mapped as an oak woodland/pine association. Blue oak (*Quercus douglasii*) woodland is usually dominant or co-dominant where it intergrades with scattered foothill/grey pine (*Pinus sabiniana*). Other oak species include low densities of valley oak (*Quercus lobata*) and interior live oak (*Quercus wislizenii*). Associations of blue oak and valley oak are relatively rare and qualify for global and state rankings of G3 and S3 (CNPS 2015).

In project areas containing deeper soils, proportions of valley oak increases, and small pockets of dominant valley oak woodland can be found. Valley oak stands form woodlands and (rarely) forests along floodplains and terraces in seasonally saturated soils (CNPS 2015). Stands of dominant valley oak were not mapped as distinct alliances in the project area due to small size; however, valley oak associations with alder (*Alnus rhombifolia*), California scrub oak (*Quercus berberidifolia*), poison oak (*Toxicodendron diversilobum*), and Himalayan blackberry (*Rubus armeniacus*) have global and state rankings of G3 and S3 respectively, indicating rarity of these alliances (CNPS 2015).

Oaks in particular provide a highly productive mast food (acorns) utilized by organisms found in the project area including deer, birds, and small mammals. It has been reported that thirty bird species are known to include acorns in their diet (Verner 1980). In addition, oak woodland and oak/pine woodland provides nesting cavities for birds and small mammals, including bats, as well as dense, contiguous coverage that provides connectivity (wildlife corridors) for larger, ranging mammals. Two dozen breeding bird species have been documented in the oak woodland (Gaines 1977). Most species found in oak woodlands, including deer and wild turkeys, also utilize annual grasslands.

Annual Grassland

Annual grassland is the largest acreage affected within the Dam Raise Project footprint. Annual grassland lacks a vegetative overstory and consists of a heterogeneous mix of non-native grasses, annual forbs, and wildflowers. The general grouping of California annual grassland includes a large variety of plant species, the majority of which are non-native and considered to be dominant species (J.O. Sawyer and T. Keeler-Wolf 2011).

Introduced annual grasses include wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*), and rattail fescue (*Festuca myuros*) (CNPS 2015). Herbaceous forbs and wildflowers within this group include both native species such as fiddle neck (*Amsinckia spp*.), western ragweed (*Ambrosia psilostachya*), popcorn flower (*Plagiobothrys spp*.), and non-native species such as shortpod mustard (*Hirschfeldia incana*), yellow starthistle (*Centaurea solstitialis*), and dove weed (*Eremocarpus setigerus*).

Quail, wild turkeys, and deer are the most common species observed within the project area grasslands; however, numerous wildlife species have been observed within the project area, including various species of birds, snakes, and mammals.

Raptors (predacious birds) utilize expanses of grasslands for primary foraging of rodents such as voles, and include red-tailed hawks (*Buteo jamaicensis*), turkey vultures (*Cathartes aura*), great horned owls (*Bubo virginianus*), and white-tailed kites (*Elanus leucurus*). Within the grassland and water interface other bird species including Canada geese (*Branta canadensis*), the great egret (*Ardea alba*), house finches (*Carpodacus mexicanus*), and spotted towhees (*Piplio maculates*) can also be seen. Other animals include snakes such as gopher snakes (*Pituophis *catenifer*), rattlesnakes (*Crotalus viridis*), and common kingsnakes (*Lampropeltis getula*), as well as mammals like the striped skunk (*Mephitis mephitis*).

Riparian Woodland

Less than one acre of Riparian woodland is found within the project footprint. Riparian vegetation occurs in association with mesic soils provided by flowing water sources. Additionally, frequent regeneration of vegetation occurs where plants are located within flood channels and scoured with flood flows. Within the project area and Folsom vicinity, riparian vegetation has decreased substantially due to land development; this contributes to its rarity in global and state rankings.

Riparian woodland consists of dominant tree species in the upper canopy layer including the Fremont's cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), and valley oak (*Quercus lobata*). A subcanopy is also present and consists of less dominant trees like the white alder (*Alnus rhombifolia*), and Oregon ash (*Fraxinus latifolia*) (CDFG 2015). There is a typical understory shrub layer consisting of California wild grape (*Vitis californica*), California wild rose (*Rosa californica*), California blackberry (*Rubus ursinus*), blue elderberry (*Sambucus cerulea*), and poison oak (*Toxicodendron diversilobum*); however, in shallower soils or frequently inundated banks, the shrublayer is primarily composed of willows and young trees. Additionally, there is an herbaceous layer consisting of sedges, rushes, and grasses including miner's lettuce (*Claytonia perfoliata*), Douglas sagewort (*Artemisia douglasiana*), poison-hemlock (*Conium maculatum*), and hoary nettle (*Urtica dioica*) (CDFG 2015).

Forage coverage and nesting habitat is of high value in riparian woodland for birds such as ruby-crowned kinglets (*Regulus calendula*), bushtits (*Psaltriparus minimus*), warbling vireos (*Vireo gilvus*), Hutton's vireos (*Vireo huttoni*), Wilson's warblers (*Wilsonia pusilla*), American robins (*Turdus migratorius*), and Bullock's orioles (*Icterus bullockii*). Cottonwood trees in particular, found in the project area's riparian woodland, are used for nesting by several species of owls, woodpeckers, and wrens as well as American kestrels (*Falco sparverius*), northern flickers (*Colaptes auratus*), white-breasted nuthatches (*Sitta carolinensis*), oak titmice (*Baeolophus inornatus*), hoary bats (*Lasiurus cinereus*), western bluebirds (*Sialia mexicana*), as well as western gray squirrels (*Sciurus griseus*) and raccoons (*Procyon lotor*).

Seasonal Wetlands

Seasonal wetlands occur within the project area next to drainages, seeps, springs, and depressions of ponded water. Less than one acre of emergent wetland habitat is present in the potential project footprint (Appendix D). Seasonal wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Vegetation, typically perennial, is present for most of the growing season in most years (Cowardin et al. 1979). Seasonal wetlands are characterized by non-woody, erect, rooted hydrophytes including sedges, rushes, and cattails but excluding mosses and lichens. For regulatory purposes, wetlands are a subgroup of waters in the United States defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support hydrophytic vegetation, and that under normal circumstances, support a prevalence of vegetation typically adapted for life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR Section 328.3; 40 CFR Section 230.3).

A wetland delineation report (USFWS 2014) was produced on the landside of dikes 4, 5, and 6, which identified a total of 0.083 acre of seasonal wetlands in two distinct parts adjacent to Dike 6. Although these wetland features are outside the project area as currently planned, the wetland features are within areas that potentially can be used for staging areas. No wetlands are identified in the staging and construction areas of Dike 4 and Dike 5.

Other wetlands tentatively identified by the Northern Sierra Nevada Foothills Vegetation project within the project area include a fresh emergent wetland of 0.53 acres in size, in a staging area identified directly south of MIAD (Appendix D). This small wetland is shown to drain into a larger wetland basin outside the staging area. Determination of this area has yet to be conducted for wetland status. Saturated soils and wetland species were also found during a site visit to drainage areas of the westernmost staging area of MIAD; these limited areas were not mapped by the Northern Sierra Nevada Foothills Vegetation Project. Seasonal ponded standing water has produced cottonwood and willow growth, along with a few hydrophytes at this site. Willow and cottonwood trees were cut by the Phase 4 JFP contractor, and the remnant stumps with vegetative regrowth are scheduled for relocation to linear wetland drainage adjacent to a downslope housing development. These areas have not yet been formally evaluated for hydric soils and hydrophytic vegetation to make a determination on wetland status. Substantial amounts of wetland and seasonal riparian habitat has been removed from the south Folsom Lake vicinity for dike/dam and residential development.

Urban/Developed Area

Approximately 54 acres of urban and developed areas are identified within the project area and potential project footprint (Appendix C). The project area is found within the southern portion of Folsom Dam Lake, of which a major portion is urbanized and the largest portion of the recent development is residential. Urban and developed areas are intensively used land with the major portions covered in pavement or by structures. This urban community includes residential, commercial, and industrial development.

Parks and other developed areas, outside of the reservoir influence, are dominated by horticultural or ruderal species. Developed areas within the project area include riprap slopes of dams and dikes, roads, trails, or parking lots. Currently, several construction staging and material storage sites are in use by the Folsom Dam modification projects, and they host non-native grasses, ruderal vegetation, or are devoid of vegetation.

Recent dam and dike construction, and structure modification, has contributed to substantial habitat disturbance and removal of riparian wetland and oak woodland habitat to accommodate construction, structures, and material disposal. Dikes and dams are generally devoid of vegetation with concrete, gravel, and compacted dirt surfaces but can include ruderal species such as non-native invasive grasses, including the shortpod mustard (*Hirschfeldia incana*), yellow starthistle (*Centaurea solstitialis*), and tree tobacco (*Nicotiana glauca*). Twenty-nine mature oaks and cottonwoods were identified for removal, along with the loss of seasonal wetland and riparian woodland acreage for dam modification projects in the project area. Remnant habitat remains, primarily in a linear strip between residential areas and dam/dike structures along the project area shoreline. They support avian species and resident wildlife of lower trophic levels that are able to co-exist with urban disturbances.

A large portion of the project area consists of disturbed ground or is devoid of vegetation, with the exception of sparse annual grasses and forbs. Various buildings, dams, water control facilities, and related facilities have been constructed on or near the project area and provide limited or no wildlife habitat. Equipment and structures on active construction sites of the Folsom Dam Modification Project have attracted nesting bird species including Anna's hummingbird (*Calypte anna*), mourning doves (*Zenaida macroura*), house finches (*Carpodacus mexicanus*), cliff swallows (*Petrochelidon pyrrhonota*), and Say's phoebe (*Sayornis saya*); it is feasible that predator avoidance overrides construction disturbance as an attractant to these sites. In addition, bald eagles (*Halieaeetus leucephalus*) and Osprey (*Pandion haliaetus*) have been sighted fishing, foraging, and roosting between open water and blue oak woodland directly over and around active construction areas. Effects of construction disturbance on the bioenergetics of these species have not been assessed. Many species have low tolerance for disturbance and would not utilize habitat near active anthropogenic sites.

The south Folsom Reservoir shoreline has incurred substantial residential and dam/dike development in the last 50 years. Urban and residential development has reduced habitat significantly in the Folsom vicinity and it constitutes marginal habitat, or is no longer considered suitable for wildlife species. Remaining habitat that is constrained by bordering urban development also supports a concentration of dam structures and construction activity along the linear shoreline. Incremental losses of oak, pine, and riparian woodlands and wetlands are at issue for retaining wildlife populations in the project area. Oak and riparian woodland habitat has been fragmented and reduced to a lower level of bioenergetics which does not sustain higher wildlife trophic levels. Urban and current Folsom construction disturbance precludes residential status for many wildlife species, particularly for those species sensitive to anthropomorphic disturbance.

Continuity and connectivity of woodland habitat around the lakefront is currently the most limiting factor for maintaining wildlife populations as development continues to fragment remaining acreages. Remaining oak, pine, and riparian woodlands are heightened in importance and critical to maintaining current wildlife populations. Wildlife populations and diversity are compromised with incremental reduction and fragmentation of habitat acreage. Sufficient habitat acreage to support bioenergetics for larger land-based mammals such as gray foxes (*Urocyon cinereoargenteus*), bobcats (*Lynx rufus*), mountain lions (*Puma concolor*), and coyotes (*Canis latrans*) are much reduced or no longer present. These species may occasionally utilize contiguous, vegetated acreages for travel, cover, and for access to suburban food sources. Wildlife species with a capacity for urban noise and activity, commonly referred to as urban wildlife, are more likely to utilize the fragmented woodlands and ruderal grasslands.

Disturbance factors such as roads, urban noise, construction sites, night lights, and toxic substances are additional contributions of developed areas which have reduced wildlife diversity and numbers. Mortality factors are high for suburban wildlife due to collisions with vehicles and power lines, toxic substances, depredation, noise, disturbance of nests and burrows, predation by dogs and humans, and other factors. Small acreages of remaining habitat can function as mortality sinks where species are attracted by useable habitat attributes but incur mortality due to unexpected anthropogenic factors.

Chaparral

Less than one acre of Chaparral is found within the project area and does not occur within the project footprint. Chaparral is usually found on drier sites with shallow, well drained soils and south-facing slopes. Vegetation is characterized by a dense overstory of woody evergreen shrubs, and understory growth is sparse or non-existent. In the project vicinity, species may include chamise (*Adenostoma fasiculatum*), manzanita (*Arctostaphylos spp.*), toyon (*Heteromeles arbutifolia*), ceanothus (*Ceanothus spp.*), and scattered California scrub oak (*Quercus berberidifolia*).

Lacustrine (Open Water) and Riverine

Lacustrine areas shown upon the Sierra Nevada Foothills map base indicate lake surfaces (open water). Aquatic and emergent vegetation is not found within the project footprint and is limited within the project area which abuts, but does not impede, on open water. Riverine indicates aquatic vegetation within the stream channel as opposed to riparian vegetation on stream bank or flood channels. The project footprint borders over 12 miles (65.756 feet) of lacustrine shoreline. Aquatic vegetation in open water and streams is sparse or not present due to fluctuations in the reservoir and intermittent flows within streambeds. Extreme seasonal water level fluctuations can occur in the reservoir ranging from elevations of 357 feet to 466 feet. A mix of barren area and sparse ruderal species seasonally vegetate the flood zone after reservoir drawdown. Sporadic willows and cottonwoods can be found in the shoreline. The continuum between lacustrine and riverine wetlands and woodlands is the most productive wildlife habitat in the vicinity. Greater wildlife diversity is provided by native ecological areas that support water access, aquatic prey, and mesic forage. Dikes and dams cover much of the lacustrine zone in the project area.

Wildlife

The project area is found within the southern portion of Folsom Dam Lake, of which a major portion is urbanized. The largest portion of recent development in the area is residential. Recent dam and dike construction, and structure modification, has also contributed to substantial habitat disturbance and removal of riparian wetland and oak woodland habitat to accommodate construction, structures and material disposal. Twenty-nine mature oaks and cottonwoods were identified for removal, along with the loss of acres of seasonal wetland and riparian woodland for dam modification projects in the project area. Remnant habitat remains, primarily in a linear strip between residential areas and dam/dike structures along the project area shoreline. They support avian species and resident wildlife of lower trophic levels that are able to co-exist with urban disturbances. Additionally, cliff swallows seasonally nest on the dam and gates.

Vegetative diversity within the project area provides a productive mosaic of habitat edge, cover, water, food-rich sources, and functional structure for wildlife which has likely been a salient element in retaining existing wildlife use of the area. Vegetation transitions as a continuum, such as from oak woodland to grass land, which provides additional habitat diversity.

Oak woodland habitat is the largest woodland acreage affected by the project. Oak in particular provides a highly productive mast food (acorns) utilized by species found in the project area such as mule deer (*Odocoileus hemionus*), wild turkeys (*Meleagris gallopavo*), western grey squirrels (*Sciurus griseus*), western scrubjays (*Aphelocoma californica),* and acorn woodpeckers (*Melanerpes formicivorus*). Verner (1980) reported that thirty bird species are known to include acorns in their diet. Tree cavities in oaks, pines, and particularly cottonwood trees found in the project area's riparian woodland are used for nesting by American kestrels (*Falco sparverius*), several species of woodpeckers, northern flickers (*Colaptes auratus*), white-breasted nuthatches (*Sitta carolinensis*), oak titmice (*Baeolophus inornatus*), western gray squirrels (*Sciurus griseus*), raccoons (*Procyon lotor*), hoary bats (*Lasiurus cinereus*), wrens (*Troglodytidae*), western bluebird (*Sialia mexicana*), and several species of owls. Two dozen breeding bird species have been documented to breed in the oak woodland (Gaines 1977).

The woodland also provides hiding cover, thermal regulation, nesting cavities, and structure for birds and mammals. Proximity to water increases this habitat value and increases food diversity. Dense, contiguous cover can provide connectivity (wildlife corridors), particularly used by larger ranging mammals. Cover forage and nest habitat is of high value in riparian woodland for birds such as ruby-crowned kinglets (*Regulus calendula*), bushtits (*Psaltriparus minimus*), warbling vireos (*Vireo gilvus*), Hutton's vireos (*Vireo huttoni*), Wilson's warblers (*Wilsonia pusilla*), American robins (*Turdus migratorius*), and Bullock's orioles (*Icterus bullockii*).

Most species found in oak and riparian woodlands also utilize annual grass lands. California quail (*Callipepla californica*), wild turkeys, and deer are the most common species observed within the project area grasslands. Raptors utilize expanses of grass lands for primary foraging of rodents such as voles. Raptors observed in the project area include red-tailed hawks (*Buteo jamaicensis*), red-shouldered hawks (*Buteo lineatus*), turkey vultures (*Cathartes aura*), great horned owls (*Bubo virginianus*), and white-tailed kites (*Elanus leucurus*). Also found within the grass lands and water interface are Canada geese (*Branta canadensis*), great egret (*Ardea alba*), house finches (*Carpodacus mexicanus*), spotted towhees (*Piplio maculates*), gopher snakes (*Pituophis catenifer*), rattlesnakes (*Crotalus viridis*), common kingsnakes (*Lampropeltis getula*), and striped skunks (*Mephitis mephitis*).

A large portion of the project area consists of disturbed ground or is devoid of vegetation, with the exception of sparse annual grasses and forbs. Various buildings, dams, water control facilities, and related facilities have been constructed on or near the project area and provide limited or no wildlife habitat, with the exception of cliff swallows (*Petrochelidon pyrrhonota*), who build their mud nests on the surface of structures, such as the dam face and gates. Equipment and structures on active construction sites of the Folsom Dam Modification Project have attracted nesting bird species including Anna's hummingbird (*Calypte anna*), mourning doves (*Zenaida macroura*), house finches (*Carpodacus mexicanus*), , owls and Say's phoebe (*Sayornis saya*). It is feasible that predator avoidance overrides construction disturbance as an attractant to these sites. Bald eagles (*Halieaeetus leucephalus*), osprey (*Pandion haliaetus*) and waterfowl have been sighted fishing, foraging, and roosting between open water and blue oak woodland directly over and around active construction areas of the Folsom Dam Modification Project. Effects of construction disturbance on the bioenergetics of these species have not been assessed. Many species have low tolerances for disturbance and would not utilize habitat near active anthropogenic sites.

The south Folsom Reservoir shoreline has incurred substantial residential and dam/dike development in the last 50 years. Urban and residential development has reduced habitat significantly in the Folsom vicinity and it constitutes marginal habitat, or is no longer considered suitable for wildlife species. Remaining habitat that is constrained by bordering urban development also supports a concentration of dam structures and construction activity along the linear shoreline. Incremental losses of oak, pine, and riparian woodlands and wetlands are at issue for retaining wildlife populations in the project area. Oak and riparian woodland habitat has been fragmented and reduced to a lower level of bioenergetics which does not sustain higher wildlife trophic levels. Urban and current Folsom construction disturbance precludes residential status for many wildlife species, particularly for those species sensitive to anthropomorphic disturbance.

Continuity and connectivity of woodland habitat around the lakefront is currently the most limiting factor for maintaining wildlife populations as development continues to fragment remaining acreages. Remaining oak, pine, and riparian woodlands are heightened in importance and critical to maintaining current wildlife populations. Wildlife populations and diversity are compromised with incremental reduction and fragmentation of habitat acreage. Sufficient habitat acreage to support bioenergetics for larger land based mammals such as gray foxes, bobcats, mountain lions, and coyotes are much reduced or no longer present. These species may occasionally utilize contiguous, vegetated acreages for travel, cover, and for access to suburban food sources. Wildlife species with a capacity for urban noise and activity, commonly referred to as urban wildlife, are more likely to utilize the fragmented woodlands and ruderal grasslands.

Disturbance factors such as roads, urban noise, construction sites, night lights, and toxic substances are additional contributions of developed areas which have reduced wildlife diversity and numbers. Mortality factors are high for suburban wildlife due to collisions with vehicles and power lines, toxic substances, depredation, noise, disturbance of nests and burrows, predation by dogs and humans, and other factors. Small acreages of remaining habitat can function as mortality sinks where species are attracted by useable habitat attributes but incur mortality due to unexpected anthropogenic factors.

3.4.2 Environmental Consequences

This section describes methodology, basis of significance, and effects to existing vegetation and wildlife resources within the project area. Proposed active construction that would potentially cause ground disturbance is referred to as the construction footprint.

Methodology

Assessment of vegetation and habitat was made from aerial photography and from vegetative delineations conducted by the Northern Sierra Nevada Foothills Project (CNPS 2015) as described under Section 3.4.1 above. Geographic Information System (GIS) overlays of the proposed project were used to quantify acreages of affected vegetation (Appendix C). A qualitative field assessment was not conducted on the entirety of the project area, but consisted primarily of vegetation and wildlife assessment over a period of four years in the vicinity of the current JFP Folsom Dam Modification Project, Approach Channel.

Project area vegetation was delineated by the Northern Sierra Nevada Foothill Project (Klein, A., J. Crawford, J. Evens, T. Keeler-Wolf, and D. Hickson 2007). The Dam Raise project footprint was mapped over delineated vegetation groups and alliances by the Corps utilizing the mapping program from the CDFW interactive website (CDFW 2015). Acreages were determined with ESRI ArcMap 10 GIS.

Mapped information provides vegetation alliances and general groupings of vegetation types as assessed from dominant vegetative overstory and understory floristic composition (Sawyer, J.O and T.Keeler Wolf 2009). An alliance is a category of vegetation classification which describes repeating patterns of plants across a landscape (Sawyer and Keeler-Wolfe 2009). Plant species composition defines an alliance, incorporating the effects of local climate, soil, water, disturbance, and other environmental factors (CNPS 2015). Vegetation assessment was conducted on a spatial scale of a minimum of eight acre size parcels (Klein, A., *et al.* 2007). Since habitat groups under eight acres in size were not included, an under estimation of woodland and wetland vegetation acreages occurred due to the fragmented nature in the project area. This size parcel also precluded site-specific identification of floristic composition down to an alliance or association level. Floristic field surveys to determine alliance or associations were not conducted for the Dam Raise project area. As a result, some mapping units are characterized by a group or macro-group. California Annual Grassland represents a grouping of all grass and herb species without a shrub or tree overstory. The macro-group of broad-leaf forest and woodland was mapped to a specific alliance of blue oak (*Quercus douglasii*). An association level was delineated for blue oak–woodland pine (*Quercus sabina*). Additional macro-groups identified and mapped within the project area include Chaparral Shrub, Valley Foothill Riparian, Wetland, Lacustrine (lake), Riverine (river), and Urban (developed) land.

Using vegetation data from the California Department of Fish and Wildlife that was input into ArcGIS allowed for the creation of an interactive vegetation map of Folsom Lake. In GIS, a construction boundary was made around the Lake's perimeter in order to estimate the vegetative areas that had been affected by construction. Using this boundary allowed for the calculation of the area of the original vegetative cover when the dam was built, minus what had been removed by the parking lot areas and urban areas. Next, assumptions were made for what kind of vegetation was removed from the construction of the parking lots and urban areas. The acreage of these areas was found using GIS and allowed for the calculation of the area of each type of vegetation that was removed. Finally, the calculations could be made for original vegetation acreage when the dam was built, the vegetation acreage removed by project construction, and the percentage of total vegetation lost. Original vegetation acreage when the dam was built was calculated by the vegetative areas that exist within the construction boundary now, plus the vegetative acreages that have been removed from the parking lots/staging areas. The project removed vegetation acreage was calculated by adding the vegetation losses expected from phase VI of the JFP to the vegetative area lost from the parking lots/urban areas. Percentage lost was calculated by the removal area divided by the total area.

Basis of Significance

Direct and indirect effects on vegetation and wildlife would be considered significant if the alternatives result in any of the following:

1. Substantial loss, degradation, or fragmentation of any natural communities or wildlife habitat.

2. Substantial reduction in the quality or quantity of important habitat with the result that native wildlife could not live or successfully reproduce in the project area.

3. Interfere substantially with the movement of any native wildlife species (habitat connectivity) or with established native resident or migratory wildlife corridors.

4. Conflict with any local, state or federal policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

5. Substantial effects on a sensitive natural community, including Federally-protected wetlands and other waters of the U.S. as defined by Section 404 of the CWA.

3.4.3 Alternative 1: No Action Alternative

Under Alternative 1, No Action, the proposed construction would not occur. No construction related effects (direct or indirect) to vegetation and wildlife would occur, and conditions in the project area would remain consistent with existing conditions assessed in Section 3.4.2.

3.4.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall

Alternative 2 is proposed to affect a construction footprint of up to up to 50 feet on both sides of Dikes 1 through 8 and MIAD, and remove vegetation and disturb the ground surface at up to thirty-one staging areas (Appendix C). The proposed project extends along the southern Folsom Reservoir shoreline for a distance of over 12 miles. Approximately fifty acres of annual grasslands, five acres of blue oak woodlands and blue oak-wood pine, and less than an acre of valley foothill riparian vegetation and fresh emergent wetland within the project footprint have the potential to be removed as a result of implementing Alternative 2 (Table 4). Smaller vegetation type acreages, however, are understated in size as blocks of vegetation under eight acres were not mapped as distinct units. The majority of the construction footprint acres are intended for use as staging or material storage areas. With the exception of staging areas, the construction of concrete floodwalls on the left wing dam (LWD) and right wing dam (RWD) would not extend past the current dam footprints and would not require an additional removal of vegetation.

The left wing dam and right wing dam surfaces are faced with large diameter rocks and boulders, usually on steep gradients. Direct construction upon the 3.5-foot concrete wall on the wing dams, dikes, and tainter gate installation is not expected to adversely affect wildlife movement because the structure impediments preclude animal travel and use. Disturbance caused by staging and stock pile construction activity, noise, traffic, and night lighting are expected to displace wildlife species through multiple years of construction from year 2017 to 2020. Interference with water access by terrestrial mammals would occur for intermittent periods from years 2017 to 2021. Loss of remaining woodland acres would substantially reduce habitat cover used to access summer and fall water sources by terrestrial wildlife populations. Disturbance from the project is expected to intermittently compromise water access to the shoreline for a period of five years. The duration of construction-created disturbances would be overlapping and continuous throughout Dikes 1 through 8. Project construction would begin at Dikes 7 and 8 shortly after the completion of restoration efforts on the Folsom Dam Approach Channel Project in the vicinity of Dikes 7 and 8. However, if habitat remains intact, displacement would be temporary in nature and would not be considered a significant impact for area wildlife populations.

Due to the fragmented nature of remaining oak, pine, and riparian woodland, Alternative 2 has a disproportionate potential to significantly impact remaining habitat connectivity by the removal of additional woodland. Permanent loss of these small acreages would be significant to local wildlife populations for access, connectivity, breeding, and foraging. Species that would be most impacted by loss of woodland include turkey, bobcats, striped skunks, gray foxes, mule deer, gray squirrels and some rodent species. Resident and migratory birds would lose foraging and breeding areas.

Table 5 shows the approximate loss or conversion of vegetation acres since the Folsom Dam and Dikes were completed within the project area. Wetlands show the greatest habitat loss from the area, while riparian woodland was largely protected in a uniform block south of

Mormon Island Dam. There is added risk of wildlife population loss due to the linear configuration of remaining habitat bordering an urban area; however, more intensive bioenergetics analysis is necessary to quantify incremental or cumulative loss to wildlife populations. With additional habitat decreases of even small or incremental acreage losses in this area, it is expected that remaining species, such as deer and turkey, would be lost as the bioenergetic requirements of individual species exceed the productivity of remaining habitat.

Because remaining habitat is narrow and does not exceed 2,000 feet in width, it is substantially more vulnerable to anthropogenic impact than a configuration supporting greater interior habitat area and wildlife cover. The magnitude of project caused disturbance would be proportionally higher as a result of the linear configuration due to lack of habitat continuity outside the project boundaries for cover, escape, or alternate use. Terrestrial and avian wildlife would need to shift primarily north or south to escape construction activity as they cannot shift into the lake or residential areas bordering residual habitat. As a result, because the habitat configuration is constrained and remaining acres are low, habitat is highly impacted in magnitude by incremental or small acreage losses.

Table 4. Potentially Affected Vegetation of Alternative 2.

Vegetation Type	Acres
Blue Oak Woodland, Blue Oak-Foothill Pine	4.9
Annual Grassland	50.4
Valley Foothill Riparian	0.1
Wetland	0.3
Reservoir/Lacustrine	19.6

Source: Northern Sierra Foothills Vegetation Project-Vegetation Mapping Report. CNPS 2015; CDFG 2015

Table 5. Vegetation Acres and Percentage Affected.

Vegetation Type	Acres Post Dam construction	Acres Removed by Subsequent Projects	Percentage Removed
Blue Oak Woodland	257.83	47.49	18.42%
Blue Oak Woodland/Foothill Pine	276.41	6.02	5.79%
Annual Grassland	492.85	97.53	19.79%
Valley Foothill Riparian	49.81	2.53	5.07%
Wetlands	8.12	3.61	44.48%

Source: Northern Sierra Foothills Vegetation Project-Vegetation Mapping Report. CNPS 2015; CDFG 2015

Indirect adverse impacts to woodland vegetation would include increased erosion, damage to roots of tree by heavy equipment, dust impacts to roadside vegetation, and invasion of exposed substrate by exotic and noxious plant species. These impacts can be partially mitigated to a less than significant level by providing dust control and a buffer for existing vegetation.

Sufficient staging acreage (157 acres) is available over 31 proposed staging areas to provide adequate flexibility to avoid loss of woodland habitat. The majority of proposed staging areas are currently delineated on disturbed and grassland substrates. Five of the staging areas are proposed within the high water line of Folsom Lake for periods of low lake level and would not impact vegetation or habitat. Tree avoidance measures and adjustment of staging area boundaries, to prevent damage or removal to individual trees and woodland boundaries, would substantially reduce impacts to remaining woodland acreage. Incorporation of mitigation measures listed in Section 3.4.5 would reduce the permanent effects of the project to less than significant. These mitigation measures require assessment of alternatives to individual oak, pine, and riparian tree removal. The achievement of no-net-loss of woodland habitat, or less than one quarter acre (or 5 trees) with Section 3.4.5 tree mitigation replacement would constitute a less than significant-action with mitigation.

Annual grassland constitutes a substantially higher acreage within the project area. Disturbance or removal of grassland can be restored/improved within a relatively short time frame due to its annual nature. However, invasive and exotic weed growth occurs rapidly in disturbed areas, and the spread of invasive species such as star thistle can preclude wildlife and human use. Introduction of invasive plants can easily occur by vehicle and construction equipment transport and can cause significant affects to existing habitat. To avoid significant impact to grassland habitat, mitigation measures listed in Section 3.4.5 would be employed. The project area would be returned to pre-existing conditions to the extent practicable at the completion of this project and improved with the use of native flora. Staging areas and other disturbed soil surfaces would be revegetated with native forb and grass species directly after construction activities cease.

Construction associated with raising embankment dams and dikes can temporarily disturb nesting birds in the project area. While some bird species acclimate to construction disturbance, it has also been shown that noise generated by motor vehicles is sufficient to decrease breeding bird fecundity (Rheindt 2003, Reijnen et al. 1995, Reijnen and Foppen 1994, and Ferris 1979). Disturbance by vehicle and pedestrian traffic and machinery would particularly disturb nesting raptors and turkeys in the project area. While some species abandon nests upon being disturbed, others exhibit adaptation to area construction. Certain species of migratory and resident birds [cliff swallows (*Petrochelidon pyrrhonota*), mourning doves (*Zenaida macroura*), Anna's hummingbirds (*Calypte anna*), Say's phoebes (*Sayornis saya*), and house finches (*Carpodacus mexicanus*)] have commonly nested on structures and construction equipment on the Folsom

Dam Modification Project and are expected to continue this behavior on structures and equipment in Alternative 2. Cliff swallows are known to nest on supporting structures for the Tainter gates. Compliance with the Migratory Bird Treaty Act would not constitute a significant issue because nest surveys conducted per Mitigation Section 3.4.5 would require nesting surveys, and nest avoidance and protection, to prevent harm to avian species. In addition, State and USFWS protocols for survey and protection of nesting raptors would be followed for the project. Pre-emptive measures would be conducted continuously by a qualified biologist to prevent birds from nesting on construction equipment and structures undergoing modifications. Environmental protection training would occur for all construction personnel regarding avian nests and environmental protection.

The modification of emergency tainter gates would result in a localized construction footprint (Figure 19) for three years. Construction noise and traffic is expected to disturb and/or displace local wildlife that utilizes oak and pine woodlands and grasslands over the project duration; however, it is expected that local wildlife utilization of the area would return to pre-construction levels post-contsturction.

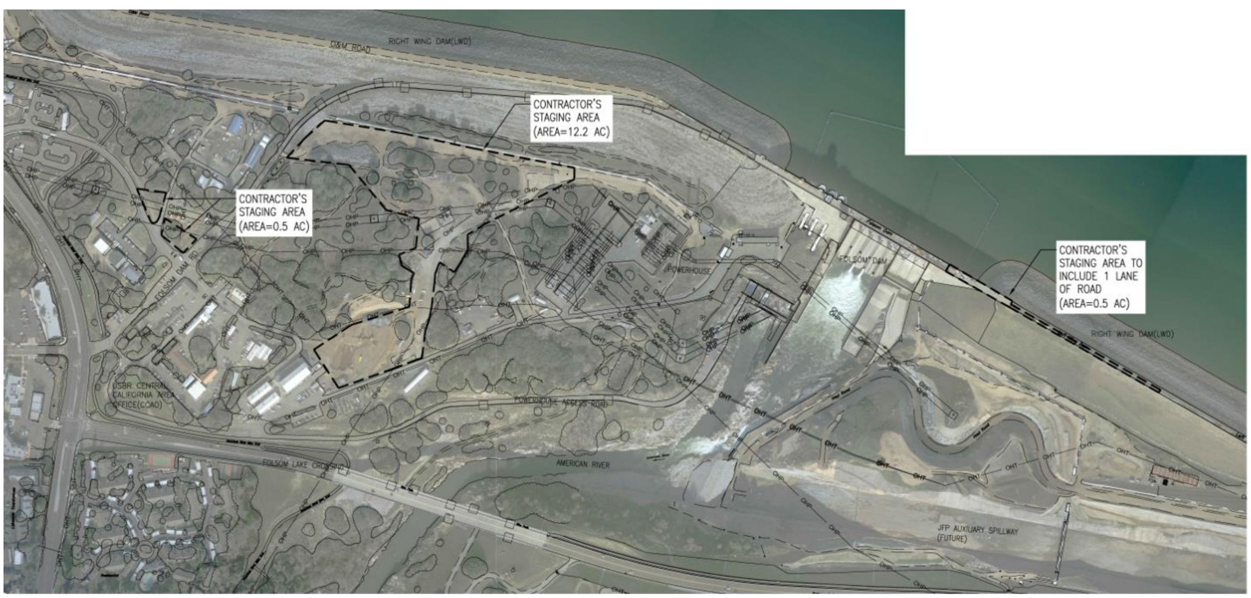

Figure 19. Tainter Gate Replacement Project Area.

Site access to the project area would occur through a Bureau of Reclamation facility on existing paved roads and through the crest of the right wing dam. Staging areas, proposed for the current Bureau of Reclamation work yard, abut the borders of remaining blue oak woodland.

Construction staging areas are proposed primarily for disturbed areas that appear to have formerly supported oak woodland vegetation, but now consist of bare soil or ruderal vegetation.

Up to two acres of oak woodland savannah is included in staging area boundaries within the tainter gate project area; however, this smaller acreage was not included in the Northern Sierra Foothills Project mapping due to limited size and was delineated as urban acreage. Though small in acreage, loss of these trees would contribute disproportionally to the reduction of oak woodland habitat in the project area. Sufficient land area is available for staging and temporary stockpiling in disturbed or open ruderal habitat to avoid removal of additional oaks, and would curtail incremental losses of contiguous oak woodland habitat. Mitigation measures for protecting existing trees would reduce these impacts to less than significant with mitigation. Other construction activity would be conducted in developed and concreted areas of the dam that would not cause impacts upon existing vegetation or habitat.

Alternative 2, Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall project is not is not expected to cause substantial loss, degradation, or fragmentation of any natural communities or wildlife habitat when conducted with mitigation specified in Section 3.4.4. The USFWS has provided a Draft Coordination Act Report (2014) (Appendix E) that specifies recommended oak mitigation measures. Native trees within the unincorporated area of Sacramento County are protected by the County Tree Preservation Ordinance and the Sacramento County General Plan Conservation Element. Compliance with this mitigation and local ordinances would ensure that significant impacts would not occur. Alternative 2 is expected to be less than significant with mitigation when measures specified in Section 3.4.4 are applied. As a result of incorporating these measures, substantial reduction would not occur to the quality or quantity of critical habitat with a result that native wildlife cannot live or successfully reproduce in the project area. Construction disturbance would interfere temporarily but not to a significant magnitude affecting the connectivity of habitat, movement of native wildlife species, established native residents or migratory corridors. Utilization of mitigation measures in Section 3.4.5 are necessary to prevent additional wildlife habitat degradation in the project area.

A wetland delineation conducted by USFWS in 2014 shows 0.083 acres of seasonal wetlands adjacent to Dike 6. Any delineated wetlands in the project area would be fenced and signed for protection from construction activity. USFWS-delineated wetlands within the vicinity of the project area would also be defined and signed for protection in the event a vehicle trespasses from the project area. Alternative 2 is not expected to affect open or other waters of the U.S. as defined by the CWA and its implementing regulations.

Local and State identified natural communities are present in oak and riparian woodland, but with incorporation of mitigation, significant effects are not expected. The project area would be returned to the pre-existing condition to the extent practicable at the completion of this project. Staging areas and other disturbed soil surfaces would be revegetated with native forb and grass species. The implementation of Alternative 2 is not expected to conflict with local policies or ordinances protecting biological resources because Sacramento County tree ordinance and USFWS recommended habitat protections and prescriptions would be observed. There are no applicable Habitat Conservation Plans (HCPs) or National Community Conservation Plans (NCCPs) in the project area. The implementation of Alternative 2 is not expected to conflict with any other approved local, regional, or state habitat conservation plan.

3.4.5 Avoidance, Minimization, and Mitigation Measures

The following avoidance, minimization, and mitigation measures, including recommendations from the USFWS Fish and Wildlife Coordination Act Report for the Folsom Dam Raise Project (February 2015), would be required and conducted by the Corps or project contractor, as appropriate, to reduce significant impacts to a less than significant level.

1. To minimize dust impacts to vegetation, wetlands, and breeding wildlife, dust control measures consistent with SMAQMD fugitive dust control measures would be implemented. Unpaved access roads would be frequently watered with raw water to prevent visible dust.

2. To prevent importation of exotic and invasive plant and animal material, contractors would clean all mud, soil, plant, and animal material from vehicles and equipment before entering the project area. The Corps or its project contractor would conduct inspections to ensure vehicles comply with this measure.

3. Before the project commences, the Corps and the contractors would identify native vegetation and habitat areas to be protected. Detailed pre-construction site drawings would be created identifying vegetated and habitat areas to be avoided, fenced, and signed for protection. These drawings would be accompanied by a narrative detailing the vegetative and wildlife protection plan. No off-road traffic would occur outside of identified staging areas.

4. Disturbance, damage, and interference to plants and wildlife, including their habitat, would be minimized. Areas that are not to be disturbed would be clearly defined by signing, fencing, or other techniques. The contractor would avoid impacts to native trees, shrubs, and aquatic vegetation to the greatest extent possible. Construction would be implemented in a manner to minimize disturbance of such areas.

5. Woody vegetation at all staging areas, borrow sites, and haul routes would be enclosed with protective construction fencing. Where practicable, a buffer would be provided; it would be one and a half times the distance of the dripline. Temporary fencing would also

be used during construction to prevent damage to native trees that are located adjacent to construction areas but can be avoided. Coordination on these areas would occur with a Corps biologist prior to work commencement.

6. Except as identified in the project drawings or plans, no tree or shrub would be removed without prior consultation and examination of alternatives with the contracting officer and a qualified Corps biologist. To minimize tree removal related to construction/staging purposes, all feasible construction or staging alternatives would be exhausted before removal of any oak, pine, or riparian trees occurs. After consultation, any native trees identified for removal would be replaced onsite, at a ratio of 1.2:1 for oak/grey pine woodland, 1/1:1 for riparian woodland in kind, as defined by the USFWS Coordination Act Report requirements (USFWS 2015). Plantings must be managed and monitored for five years until determined to be established and self-sustaining.

7. Any tree or shrub, or part thereof, identified for removal would be removed during the period of November through January (*i.e.* months within the designated non-nesting season for local avian species) with the assistance of a trained arborist as applicable. Any requested exceptions to these dates would be preceded by a survey conducted by a qualified avian biologist to identify any active avian nests. If active nests are found, vegetation would not be removed until any young have fledged.

8. Before and during the nesting season, a qualified biologist would conduct nesting surveys along proposed construction sites, structures within the construction sites (e.g. gate strutures and other parts of the dam subject to modification or disturbance), haul roads, staging areas, and stockpile sites. If nests are found, work activity around the nests would be avoided until the young have fledged. CDFW protocol survey for Sacramento Swainson's hawks would suffice for most preconstruction nest surveys for raptors. Great horned owls in particular would be surveyed at an earlier date. The following protocol would suffice for pre-construction survey for raptors:

> A focused survey for Swainson's hawk nests would be conducted by a qualified biologist during the nesting season (February to August 31) to identify active nests within 0.25 mile of the project area. The survey would be conducted for no less than 14 days and no more than 30 days prior to the beginning of construction. If nesting Swainson's hawks are found within 0.25 mile of the project area, no construction would occur during the active nesting season of February 1 to August 31, or until the young have fledged (as determined by a qualified wildlife biologist), unless otherwise negotiated with the California Department of Fish and Wildlife. If work is begun and completed between September 1 and February 28, a survey is not required.

9. Pre-emptive avoidance measures would be conducted before nesting season occurs to prevent nesting on equipment and structures, such as the use of netting on structures to prevent cliff swallow nesting activity. Any discovered nests would be reported to the Corps biologist, and the nest would be avoided until assessment. No active nests would be disturbed so as to cause disturbance, harassment, or nest abandonment.

10. A qualified avian biologist/environmental monitor, approved by the Corps, would be employed up to a full time basis onsite, as needed, to ensure project compliance with the Migratory Bird Treaty Act and other environmental mitigations and protections.

11. The Corps and the project site biologist/monitor would ensure that all construction personnel undergo environmental protection training to be aware of all required environmental protections (bird, wildlife, and vegetation protection) per these mitigations, and by federal and state law. Any vegetation or wildlife habitat issues would be reported directly to the Contracting Officer and Corps biologists.

12. Construction materials likely to lead to entrapment of wildlife would be removed nightly as applicable. Wildlife escape ramps would be installed in construction areas that contain steep-walled holes or trenches. All trash and food-related waste would be placed in self-closing trash containers and removed nightly.

13. Native species specific to the project area would be planted through a revegetation plan with a mitigation and monitoring plan to address revegetation of all disturbed or destroyed vegetation within the project area. The revegetation plan would be implemented immediately following construction in accordance with requirements in the SWPPP and Mitigation, Monitoring, and Reporting Plan. Reseeded grassland areas would be periodically monitored until 85 percent vegetation cover is achieved. The targets will be established by the Corps, and the contractor will implement planting and conduct monitoring to meet those targets for 3 years.

14. All revegetated or disturbed areas would be monitored during the contract warranty period by a qualified biologist for percent coverage and invasive non-native plant species.

15. Assessment would be conducted of any drainage depression or channels that provide hydrological contributions to wetlands. These channels would be maintained to assure continuing drainage into off site wetlands. No entry or disturbance of wetlands would be allowed within the project area or off site, and they would be fenced and signed. Wetlands identified by the Northern Sierra Foothills project at MIAD would be assessed before project commencement, and appropriate protections would be provided.

16. In the event that mitigation is not initiated within a two year period after each phase of project completion, mitigation ratios would increase by 0.5:1 if initiated within two to five years and by 1:1 if mitigation is initiated more than five years after the permanent or temporary impacts occur (USFWS 2012).

17. All BMPs would be strictly followed to prevent spills of toxic substances. Appropriate materials for spill containment and cleanup would be maintained onsite. No staging of vehicles or equipment would occur within 50 feet of the water edge of Folsom Lake to prevent accidental inundation and toxic infiltrations.

18. All restoration would be coordinated with the Bureau of Reclamation, USFWS, and Sacramento County as appropriate.

3.5 Special Status Species

3.5.1 Environmental Setting

Regulatory Setting

The following Federal, State, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations can be found in Chapter 5.0.

Federal

- Federal Endangered Species Act (16 U.S.C. 1531 et seq.)
- Migratory Bird Treaty Act (16 USC §703-712)

State

- California Endangered Species Act (Fish and Game Code 2050 et seq.)

Existing Conditions

Special-status species are defined as:

- Species that are listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the *Federal Register* for proposed species);

- Species that are candidates for future listing as threatened or endangered under the ESA (72 FR 69034, December 6, 2007);

- Species listed or proposed for listing by the State of California as threatened or endangered under the CESA (14 CCR 670.5);

- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380);

- Animals that are California species of special concern (California Department of Fish and Game 2008); Remsen 1978);

- California Department of Fish and Game and Point Reyes Bird Observatory 2001 [birds]; Wouldiams 1986 [mammals]; and Jennings and Hayes 1994 [amphibians and reptiles]); and,

- Animals fully protected in California (CFGC 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians].

Federally-listed proposed, candidate, threatened, or endangered species (listed species) and their associated critical habitat were obtained for the Folsom, Rocklin, and Clarksville 7.5 Minute USGS Quadrangles via the USFWS website and the California Natural Diversity Database (CNDDB) (USFWS, CNDDB 2015). The USFWS and CNDDB lists are included in Appendix F. A total of 17 special status species are identified as having the potential to occur within the Folsom, Clarksville, and Rocklin quadrangles. Because there would be no in-water work, special-status fish species are not included and would not be discussed in this document. Table 6 lists the special status species and provides their listing status, basic habitat requirements, and potential to occur in the project area.

Table 6. Special Status Species with Potential to Occur in the Project Area.

Species	Status	Habitat	Potential for Occurrence
Invertebrates			
Conservancy fairy shrimp *Branchinecta conservatio*	FE	Inhabits vernal pools	Unlikely; no known populations in the area. Need to conduct survey prior to construction.
vernal pool fairy shrimp	FT		

Species	Status	Habitat	Potential for Occurrence
Branchinecta lynchi		Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swales, earth slumps, or basalt-flow depression pools	Unlikely; no known population is the area. Need to conduct survey prior to construction.
valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus mexicana*); primarily in riparian woodland and scrub habitat.	Known to occur in the project area. Twenty elderberry shrubs were located within the project area in a 2014 survey.
Amphibians and Reptiles			
California tiger salamander, central population *Ambystoma californiense*	FT	California endemic, a lowland species restricted to the grasslands and lowest foothill regions of Central and Northern California, which is where its breeding habitat (long-lasting rain pools) occurs. During dry-season, uses small mammal burrows as refuge, travelling up to 1.6 kilometers (km).	Unlikely to occur; outside the Spawning range for the species
California red-legged frog *Rana draytonii*	FT, SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development and must have access to aestivation habitat.	Unlikely to occur due to presence of predator bull frog species and low quality habitat.
Giant garter snake *Thamnophis gigas*	FT	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals & irrigation ditches. This is the most aquatic of the garter snakes in California.	Unlikely to occur; no suitable habitat is in project area.

Species	Status	Habitat	Potential for Occurrence
Birds			
Bald eagle *Haliaeetus leucocephalus*	SE	Typically found in coniferous forest habitats with large, old growth trees near permanent water sources such as lakes, rivers, or ocean shorelines.	Known to occur in the project area.
California black rail *Laterallus jamaicensis coturniculus*	ST	**I**nhabits tidal marshes and freshwater marshes in the western United States and Mexico. Tend to inhabit the drier portions of wetlands.	Unlikely to occur; no suitable habitat in project area.
Cooper's hawk *Accipiter cooperii*	SSC	Nests in riparian woodland or forest dominated by cottonwoods and willows. Occurs principally as a migrant and summer resident from late March through early October; breeds from April to late July.	Unlikely; no suitable nesting or foraging habitat is present within project area. Could be observed during migration in California.
Swainson's hawk *Buteo swainsoni*	ST	Restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available. Requires large, open grasslands with abundant prey in association with suitable nest trees.	Potential to occur in the project area.
tricolored blackbird *Agelaius tricolor*	SE, SSC	Highly colonial species, most numerous in Central Valley and vicinity: largely endemic to California. Requires open water, protected nesting substrate, & foraging area with insect prey within a few kilometers of the colony.	Unlikely to occur; no suitable habitat is in project area.
Plants			
Boggs Lake hedge-hyssop *Gratiola heterosepala*	SE	Can be found in marshes, swamps (lake margins), and vernal pool habitats on clay soils ranging from 10 to 2,375 meters in elevation. Known to occur in Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano and Tehama Counties as well as parts of Oregon.	Unlikely to occur; small areas of seasonal wetlands and marshy habitat present within the project area, but not on clay soils.
El Dorado bedstraw *Galium californicum ssp. sierrae*	FE, SR	Only found within El Dorado County. Exists within chaparral, cismontane woodland, lower montane and coniferous forest habitats and gabbroic soils within an elevation range from 100 to 585 meters.	Unlikely to occur in the project area based on the lack of chaparral and coniferous forest.

Species	Status	Habitat	Potential for Occurrence
Layne's ragwort *Packera layneae*	FT	Can be found in Butte, El Dorado, Placer, Tuolumne, and Yuba Counties. Habitat is chaparral or cismontane woodland, located in serpentinite, gabbroic, or rocky soils.	Unlikely to occur in the project area; plant is endemic to the western slopes of the northern Sierra Nevada foothills, but not within the project footprint.
Pine Hill ceanothus *Ceanothus roderickii*	FE, SR	This species grows only on gabbro soils in western El Dorado County, scattered throughout areas of chaparral.	Unlikely to occur; no suitable habitat is in project area.
Pine Hill flannelbush *Fremontodendron decumbens*	FE, SR	Only known from the central portion of western Eldorado County in the vicinity of Pine Hill itself. Habitat includes live oak woodland with a significant shrub component.	Unlikely to occur; no suitable habitat is in project area.
Sacramento Orcutt grass *Orcuttia viscida*	FE, SE	Endemic to Sacramento county. Grows only in vernal pools	Unlikely; no suitable habitat in the project area. Need to conduct survey prior to construction

(FE) Federal Endangered Species (FT) Federal Threatened Species
(SE) State Endangered Species (ST) State Threatened Species
(FP) State Fully Protected (SSC) California Species of Special Concern

Special status species that were not identified as occurring or having habitat in the project area are not discussed further in this document. The following Federally and State listed species are identified as having the potential to occur in the vicinity of the project areas and could be affected by construction activities:

- Valley elderberry longhorn beetle (Federal Threatened)
- Bald eagle (State Endangered)
- Swainson’s hawk (State Threatened)

Valley Elderberry Longhorn Beetle.

The valley elderberry longhorn beetle (VELB) is federally listed as threatened under the ESA. In October of 2012, the USFWS recommended in the Federal Register (78 FR 4812) that the beetle be delisted. After review of updated species information, the recommendation was withdrawn in September of 2014 (79 FR 55879 55917). The range of the beetle extends throughout the Central Valley and associated foothills, from the 3,000-foot-high contour in the east foothills, through the valley floor, to the watershed of the Central Valley in the west foothills. Elderberry shrubs are found in the remaining riparian forests and grasslands of the Central Valley and adjacent foothills. This beetle is often associated with various plant species, such as Freemont’s cottonwood, California sycamore, willow, and oak (USFWS 1999a).

Elderberry shrubs (*Sambucus* sp.) are the host plant for VELB and are a common component of the remaining riparian forests of the Central Valley. Elderberry shrubs are also common in upland habitats. Field surveys have found that adult VELB feed on elderberry foliage, and perhaps flowers, and are present from March through early June. It is during this time that the adults mate. The females lay their eggs, either singularly or in small clusters, in bark crevices or at the junction of stem and trunk or leaf petiole and stem. After hatching, a larva burrows into the stem of the elderberry where it creates a gallery, which it fills with grass and shredded wood. After the larva transforms into an adult beetle, it chews an exit hole and emerges from the elderberry. The life span of VELB ranges from 1 to 2 years. Studies of the spatial distribution of occupied shrubs suggest that the beetle is a poor disperser (USFWS 1999a). No critical habitat has been identified for this species.

During two biological surveys conducted by USACE, USFWS, DWR, and Reclamation staff on April 9th and 19th, 2014, a total of 22 elderberry shrubs were identified within or nearby the project area. Twelve (12) shrubs were located at the Right Wing Dam, three (3) were located at Dike 6, two (2) were located between Dikes 5 and 6, and five (5) were located at Dike 1 (Figure 20).

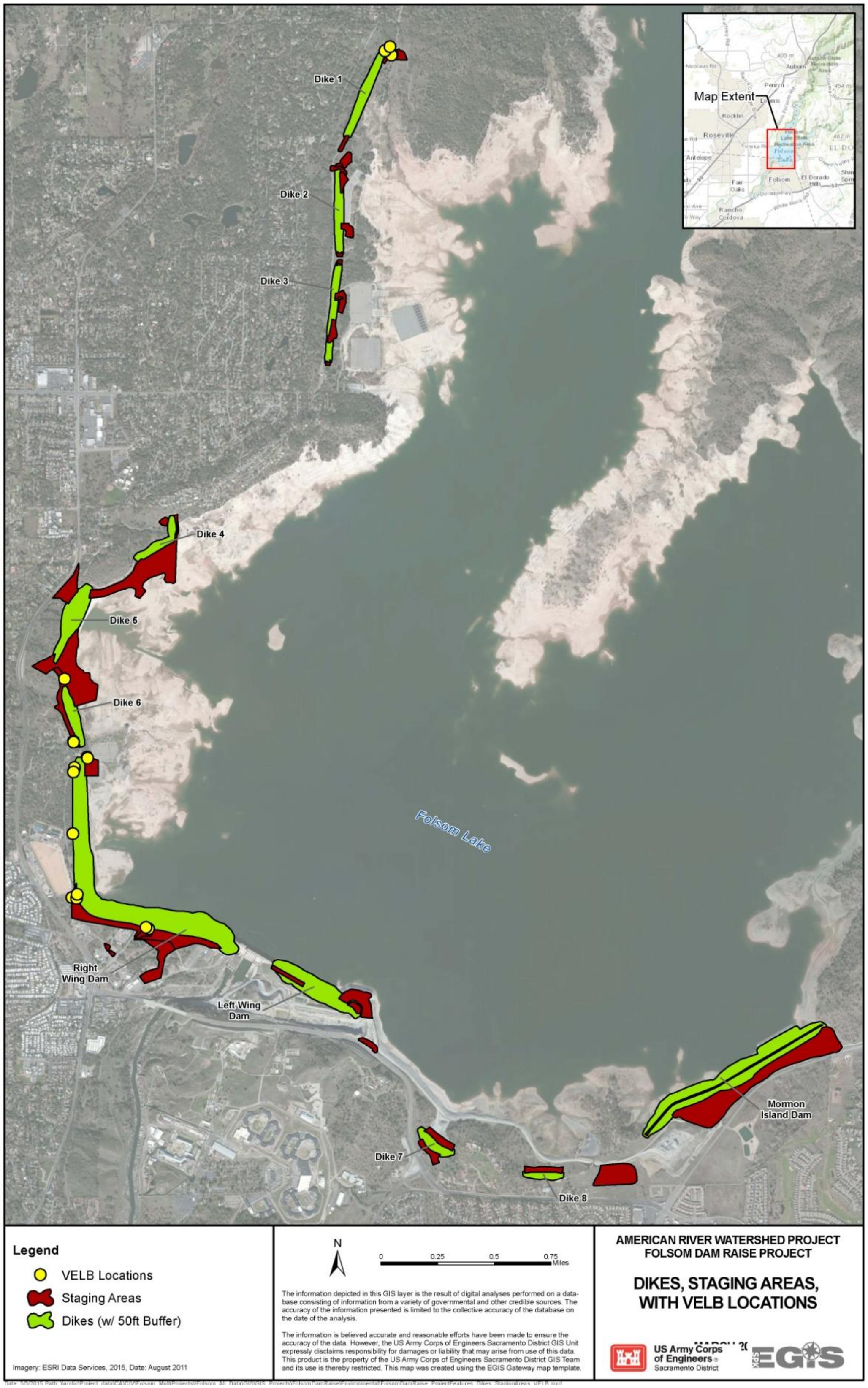

Figure 20. Dikes and Staging Areas for Alternative 2 with Elderberry Shrub (VELB) Locations.

Bald Eagle.

This species is a permanent resident and uncommon winter migrant in California. Breeding is mostly restricted to Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity Counties. About half of the wintering population is in the Klamath Basin. The bald eagle is fairly common as a local winter migrant in a few favored inland waters in Southern California. The largest numbers of bald eagles occur at Big Bear Lake, Cachuma Lake, Lake Matthews, Nacimiento Reservoir, San Antonio Reservoir, and along the Colorado River. Bald eagles are typically found in coniferous forest habitats with large, old growth trees near permanent water sources such as lakes, rivers, or ocean shorelines. This eagle requires large bodies of water with abundant fish and adjacent snags, or other perches for foraging. Bald eagles prey mainly on fish, and occasionally on small mammals or birds, by swooping from a perch or during mid-flight. This eagle also scavenges dead fish and other dead animals. Nests are found in large, old growth or dominant trees, especially ponderosa pine with an open branch-work, usually 50 feet to 200 feet above the ground. It breeds February through July, with peak activity from March to June. Clutch size is usually two. Incubation usually lasts 34 to 36 days (Zeiner et al. 1990a).

The bald eagle is known to occur within the project area and vicinity, and based on the availability of adequate nesting sites and foraging habitat, would continue to utilize habitat within the project area. Bald eagles have over-wintered in the area but there are no reports of successful nest building activities. No critical habitat has been designated for this species.

Swainson's hawk.

Swainson's hawks are protected under the MBTA and are State-listed as threatened. Swainson's hawks inhabit grasslands, sage-steppe plains, and agricultural regions of western North America during the breeding season, and winter in grassland and agricultural regions from central Mexico to southern South America (England et al. 1997). In California, the nesting distribution includes the Sacramento and San Joaquin Valleys, the Great Basin sage-steppe communities and associated agricultural valleys in extreme northeastern California, isolated valleys in the Sierra Nevada in Mono and Inyo Counties, and limited areas of the Mojave Desert region (CDFG 1994).

Since 1980, based on nesting records alone, populations in California appear relatively stable. However, continued agricultural conversion and practices, urban development, and water development have reduced available habitat for Swainson's hawks throughout their range in California; this habitat reduction could potentially result in a long-term declining trend. The status of populations, particularly with respect to juvenile survivorship, remains unclear.

In California, Swainson's hawk habitat generally consists of large, flat, open, undeveloped landscapes that include suitable grassland or agricultural foraging habitat and sparsely distributed trees for nesting. Foraging habitat includes open fields and pastures. Preferred foraging habitats for Swainson's hawk include alfalfa fields, fallow fields, low-growing row or field crops, rice fields during the non-flooded period, and cereal grain crops. Prey species include ground squirrels, California voles, pocket gophers, deer mice, reptiles, and insects (CDFG 2000; England et al. 1997).

Swainson's hawk often nests peripherally to riparian systems, and are known to utilize lone trees or groves of trees in agricultural fields. Valley oak (*Quercus lobata*), Fremont's cottonwood (*Populus fremontii*), walnut (*Juglans nigra*), and large willow (*Salix* spp.) with an average height of about 60 feet are the most commonly used nest trees in the Central Valley. Breeding occurs late March to late August, with peak activity from late May through July. Clutch size is two to four eggs (Zeiner et al. 1990a). This species may use the riparian trees in the project area as nest sites, and they may forage in the uplands.

3.5.2 Environmental Consequences

Methodology

Based on the USFWS list for the quadrangles within the study area (Clarksville, Folsom, and Rocklin), a review of CNDDB occurrences within a 10-mile radius of the study area, and biologist's observations during reconnaissance-level surveys, three special-status wildlife species were identified as having potential to occur within the study area and surrounding region.

Basis of Significance

For this analysis, a direct and indirect effect, based on professional practice and NEPA and CEQA Guidelines to special status species, was considered significant if it met one or more of the following significance criteria:

- Have a substantial adverse effect, either directly or indirectly, on species growth, survival, or reproductive success through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by CDFW or the USFWS;

- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

- Contribute to a substantial reduction or elimination of species diversity or abundance; or
- Have an adverse effect on a species' designated critical habitat, if applicable.

3.5.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in the construction of the proposed project. There would be no construction-related effects to existing special status species or critical habitat. The types of special status species and their associated habitats would remain the same. Current dam and dike maintenance, recreation, and public activity would not change. The effects of these activities on special status species and their associated habitat would be the same; however, a PMF flood event may result in the loss of critical habitat, and special status species could be adversely affected.

3.5.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall

A draft Biological Assessment (BA) has been completed and sent to USFWS and NMFS for their review and comment. The Corps would initiate formal consultation with USFWS and NMFS in November 2015.

Valley Elderberry Longhorn Beetle (VELB).

Direct effects to VELB may occur if elderberry shrubs are incidentally damaged by construction personnel or equipment. Impacts may also occur if elderberry shrubs need to be transplanted because they are located in areas that cannot be avoided by construction activities. Potential impacts due to damage or transplantation include direct mortality of beetles and/or disruption of their lifecycle. Indirect effects to VELB could occur when haul trucks are driving in close proximity to elderberry shrubs. This could disturb the beetle due to vibration and dust.

Long-term effects of the project may include reduced viability of elderberry shrubs due to the placement of project area materials. Loss of habitat or species abundance may also occur due to transplantation of elderberry shrubs. Although compensation measures include restoration and creation of habitat, mitigation plantings would likely require five or more years to become large enough to provide supporting habitat. Furthermore, associated riparian habitats may take 25 years or longer to reach their full value. Removal of plants may also fragment remaining habitats, which may make dispersal more difficult. However, there is no designated critical habitat for VELB.

The construction of Alternative 2 would potentially result in both direct and indirect effects to elderberry shrubs, the critical habitat of the VELB. Direct effects would include removal or damage to the shrubs during site preparation and construction activities near the RWD, Dike 6, and Dike 1 (see Figure 16 for exact locations). Indirect effects would include physical vibration and an increase in dust during operation of equipment and trucks during construction activities. These indirect effects would be short-term during construction and are considered less than significant with the implementation of the avoidance and minimization measures discussed below. Direct and indirect effects would be considered potentially significant if they cause adverse effects on elderberry shrubs and/or cause mortality or stress to VELB residing in the shrubs. However, with the implementation of mitigation measures, transplanting of shrubs, mitigation plantings, and creation of habitat, these impacts are considered less than significant and not likely to adversely affect VELB.

Table 7. Folsom Dam Raise Elderberry Shrub Survey Results.

Location	GPS ID	Stem Size @ Ground Level			Lat	Lon
		≥ 1" & ≤ 3"	> 3" & < 5"	≥ 5"		
Right Wing Dam	5	1			38°43.172'	121°10.264'
Right Wing Dam	6	--	--	--	38°43.175'	121°10.264'
Right Wing Dam	7	1			38°43.158'	121°10.269'
Right Wing Dam	8			1	38°42.922'	121°10.275'
Right Wing Dam	9	1			38°42.677'	121°10.282'
Right Wing Dam	10	1			38°42.673'	121°10.260'
Right Wing Dam	11	1			38°42.688'	121°10.257'
Right Wing Dam	12	1			38°42.554'	121°09.909'
Right Wing Dam	13	1			38°42.560'	121°09.920'
Right Wing Dam	14		1		38°42.560'	121°09.920'
Right Wing Dam	15	1			38°43.214'	121°10.201'
Right Wing Dam	16	1			38°43.211'	121°10.199'
Dike 6	17	1			38°43.275'	121°10.268'
Dike 6	18	1		1	38°43.272'	121°10.266'
Dike 6	193	3			38°43.291'	121°10.233'
Between Dike 5 and 6	19		1		38°43.514'	121°10.309'
Between Dike 5 and 6	20		1		38°43.514'	121°10.309'
Dike 1	21				38°45.896'	121°08.676'
Dike 1	22	5			38°45.896'	121°08.677'
Dike 1	23				38°45.894'	121°08.678'
Dike 1	24	1			38°45.911'	121°08.711'
Dike 1	25	1			38°45.926'	121°08.685'

Effects to Bald Eagle.

The bald eagle is known to occur within the general vicinity of the staging areas. However, the staging areas are highly disturbed and do not provide high quality habitat for this species. Replacement of emergency tainter gates would not have a direct or indirect effect on the growth, survival, or reproductive success of the bald eagle. The construction of Alternative 2 would not cause direct mortality, long-term habitat loss, or lowered reproduction success of the bald eagle. No critical habitat has been designated for this species. Although there are oaks present within the CCAO yard, the primary staging area for this alternative, it is currently used as an active maintenance and staging yard for the main dam and is highly disturbed habitat. Because this area is already heavily utilized, it is unlikely that additional staging for Alternative 2 would further disturb any bald eagles in the area. Additionally, due to the disturbed nature of the habitat and mobility of the Bald Eagle, project construction activities would not interfere substantially with the movement Bald Eagles in the vicinity of the project area or affect the population or diversity.

However, prior to construction activities, bald eagle surveys would be conducted within the study area to determine the locations of potential nest sites. The surveys would be conducted annually in close proximity to construction locations and within one-half mile of any anticipated construction. If any active nests are found within one-half mile of construction sites, coordination with USFWS and CDFW would occur to determine avoidance and minimization measures, and construction would not be initiated until nestlings are fledged and the bald eagles move out of the project area. Therefore, the effect to bald eagles is considered less than significant.

Effects to Swainson's Hawk.

The Swainson's hawk is known to occur within the general vicinity of the project area. However, there have been no recorded nesting sites above the Nimbus Dam on the American River. In addition, the staging and construction areas for this project are highly disturbed and do not provide high quality habitat for this species. Replacement of emergency tainter gates would not have a direct or indirect effect on the growth, survival, or reproductive success of the Swainson's hawk. The construction of Alternative 2 would not cause direct mortality, long-term habitat loss, or lowered reproduction success of the Swainson's hawk. No critical habitat has been designated for this species. Although there are oaks present within the CCAO yard, the primary staging area for this alternative, it is currently used as an active maintenance and staging yard for the main dam and is a highly disturbed habitat. Because this area is already heavily utilized, it is unlikely that additional staging at Alternative 2 would further disturb any Swainson's hawks in the area. Additionally, due to the disturbed nature of the habitat and mobility of the Bald Eagle, project construction activities would not interfere substantially with the movement Bald Eagles in the vicinity of the project area or affect the population or diversity.

However, prior to construction activities, hawk surveys would be conducted within the study area to determine the locations of potential nest sites. The surveys would be conducted annually in close proximity to construction locations and within one-half mile of any anticipated construction. If any active nests are found within one-half mile of construction sites, then coordination with USFWS and CDFW would occur to determine avoidance and minimization measures, and construction would not be initiated until nestlings are fledged and the Swainson's hawks move out of the project area. Therefore, the effect to Swainson's hawk is considered less than significant.

3.5.5 Avoidance, Minimization, and Mitigation Measures

The following measures were proposed by the Corps to avoid, minimize, or mitigate significant effects associated with the Dam Raise Project to less than significant.

Valley Elderberry Longhorn Beetle.

The Corps would compensate for the loss of elderberry shrubs if they are removed. The elderberry shrubs would be transplanted to a USFWS approved location and monitored for 5 years. Compensation would also consist of planting elderberry shrubs and associated native plants at an existing Corps mitigation site in the American River Parkway, or credits would be purchased at a USFWS approved mitigation bank. If the shrubs are not removed, and the proposed Dike 8 disposal area is used, the following measures taken from the USFWS "Conservation Guidelines for the Valley Elderberry Longhorn Beetle, July 1999" would be incorporated into the project to minimize potential take of the VELB:

- A minimum setback of 100 feet from the dripline of all elderberry shrubs would be established, if possible. If the 100 foot minimum buffer zone is not possible, the next minimum distance allowable would be established. These areas would be fenced, flagged, and maintained during construction. When a 100-foot (or wider) buffer is established and maintained around elderberry shrubs, complete avoidance (i.e., no adverse effects) would be assumed.

- Where encroachment on the 100-foot buffer has been approved by the USFWS, a setback of 20 feet from the dripline of each elderberry shrub would be maintained whenever possible.

- Environmental awareness training would be conducted for all workers before they begin work. The training would include status, the need to avoid adversely affecting the elderberry shrub, avoidance areas and measures taken by the workers during construction, and contact information.

- Signs would be placed every 50 feet along the edge of the elderberry buffer zones. The signs would include: "This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be readable from a distance of 20 feet and would be maintained during construction.

- During construction activities, all areas to be avoided would be fenced and flagged.

- Any damage done to the buffer area would be restored.

- No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant would be used in the buffer areas.

- Trimming of elderberry plants would be subject to mitigation measures.

- Elderberry shrubs that cannot be avoided would be transplanted to an appropriate riparian area at least 100 feet from construction activities.

- If possible, elderberry shrubs would be transplanted during their dormant season (approximately November, after they have lost their leaves, through the first two weeks in February). If transplantation occurs during the growing season, increased mitigation ratios would apply.

- Any areas that receive transplanted elderberry shrubs and elderberry cuttings would be protected in perpetuity.

- The Corps would work to develop off site compensation areas prior to or concurrent with any take of valley elderberry longhorn beetle habitat.

- Management of the area within the project impact zone would include all measures specified in USFWS's conservation guidelines (1999a) related to weed and litter control, fencing, and the placement of signs.

- Monitoring would occur for ten consecutive years or for seven non-consecutive years over a 15-year period. Annual monitoring reports would be submitted to USFWS.

- Offsite areas would be protected in perpetuity and have a funding source for maintenance (endowment).

Impacts to VELB would be considered less than significant with the implementation of the USFWS conservation guidelines for the beetle.

Bald Eagle, Swainson's Hawk, and Special Status Migratory Birds

To avoid and minimize effects to Bald Eagle, Swainson's hawk, and other migratory birds, the Corps would implement the following measures:

- A breeding season survey for nesting birds would be conducted for all trees and shrubs that located within 0.5 miles of construction activities, including grading. Swainson's hawk surveys would be completed in compliance with the CDFW survey guidance (Swainson's hawk Technical Advisory Committee 2000). Other migratory bird nest surveys can be conducted concurrent with the Swainson's hawk surveys, with at least one survey to be conducted no more than 48 hours from the initiation of project activities to confirm the absence of nesting. If the biologist determines that the area surveyed does not contain any active nests, construction activities, including removal or pruning of trees and shrubs, can commence without any further mitigation.

- If active nests are found, the Corps would maintain a 0.5-mile buffer between construction activities and the active nest(s). In addition, a qualified biologist would be present onsite during construction activities to ensure the buffer distance is adequate and the birds are not showing any signs of stress. If signs of stress that can cause nest abandonment are noted, construction activities would cease until a qualified biologist determines that fledglings have left an active nest.

- Tree and shrub removal, and other areas scheduled for vegetation clearing, grading, or other construction activities, would not be conducted during the nesting season (generally February 15 through August 31 depending on the species and environmental conditions for any given year).

Impacts to Bald Eagle and Swainson's hawk would be considered less than significant with the implementation of the measures identified above.

3.6 Air Quality

3.6.1 Environmental Setting

Regulatory Setting

The United States Environmental Protection Agency (USEPA) has established primary and secondary National Ambient Air Quality Standards (NAAQS) under the provisions of the Clean Air Act (CAA). The CAA set emission limits for certain air pollutants from specific sources, set new source performance standards based on best demonstrated technologies, and established national emissions standards for hazardous air pollutants.

The USEPA classifies the air quality within a control region according to whether the region meets or exceeds Federal primary and secondary NAAQS. Primary standards define levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards define levels of air quality necessary to protect public welfare (i.e., soils, vegetation, and wildlife) from any known or anticipated adverse effects of a pollutant. Federal NAAQS are currently established for seven principal pollutants (known as "criteria pollutants") including carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), sulfur dioxide (SO2), lead (Pb), particulate matter equal to or less than 10 micrometers in aerodynamic diameter (PM10), and very fine particulate matter (PM2.5).

Responsibility for attaining and maintaining air quality in California is divided between the California Air Resources Board (ARB) and Regional Air Quality Districts. Areas of control for the regional districts are set by ARB, which divides the State into air basins. These air basins are defined by topography that limits air flow access, or by county boundaries.

The following Federal, State, and local laws, regulations, and policies apply to the resources covered in this Section. Descriptions of the laws and regulations can be found in Section 5.0, Compliance with Environmental Laws and Regulations.

- Federal:
    - Clean Air Act, 42 U.S.C §7401, *et seq.*
    - Federal Tailpipe Emission Standards, 40 CFR Part 88
    - General Conformity Regulation, 40 CFR Parts 5, 51 and 93
    - National Ambient Air Quality Standards, 40 CFR Part 50

- State:
    - Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations
    - California Ambient Air Quality Standards

- California Clean Air Act, Health and Safety Code, Division 26
- Idling Limit Regulation, Title 13, California Code of Regulations

- Local:
    - El Dorado County Air Quality Management District Standards
    - Placer County Air Pollution Control District Standards
    - Sacramento Metropolitan Air Quality Management District Standards

Existing Conditions

The study area for the Dam Raise is located in the Sacramento Valley Air Basin (SVAB), which includes Sacramento County, Placer County, and El Dorado County. Sacramento Metropolitan Air Quality Management District (SMAQMD) is the lead on air quality considerations for all air quality districts for the JFP and Dam Raise projects. Criteria air pollutants relevant to the project were determined based on the existing pollutant conditions in the SVAB. Toxic Air Contaminants (TACs) relevant to the project were determined based on SMAQMD guidance and the project site conditions.

Air Pollutants

Air pollutants relevant to the project and their health effects are discussed below and summarized in Table 8. In addition, sensitive receptors are defined and receptors near the project area are identified.

Table 8. Summary of Air Pollutants of Concern for the Project.

Pollutant Class	Pollutant	Existing Condition
Criteria Pollutants	CO, NO_2, O_3 (precursors: NO_x, ROG), PM10, PM2.5, and SO_2	The SVAB has NAAQS and/or CAAQS non-attainment designations for PM10, PM2.5, and O3. The SVAB is also a maintenance area (formerly non-attainment) for CO. Consequently, PM10, PM2.5, CO, and ozone precursor (ROG and NOx) emissions are the primary criteria pollutants of concern associated with the project.
TACs	DPM and NOA*	Local geology supports the formation of NOA, although no NOA has been located within the project site. The primary DPM sources associated with the project are diesel-powered on-road haul trucks and off-road construction equipment.

*DPM = Diesel Particulate Matter
*NOA = Naturally Occurring Asbestos

Criteria Pollutants: Criteria pollutants include CO, NO_2, O_3, PM_{10}, $PM_{2.5}$, and SO_2. Ozone is a secondary pollutant that is not emitted directly into the atmosphere. Instead, it forms by the reaction of two ozone precursors – reactive organic gases (ROGs) and nitrogen oxides (NO_x) – in the presence of sunlight and high temperatures.

Toxic Air Contaminants (TAC): A TAC is defined by California law as an air pollutant that "may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." The USEPA uses the term hazardous air pollutants (HAPs) in a similar sense. Controlling toxic air emissions became a National priority with the passage of the Clean Air Act Amendments, whereby Congress mandated that USEPA regulate 188 air toxicants. TACs can be emitted from stationary and mobile sources.

Ten TACs have been identified through ambient air quality data as posing the greatest health risk in California. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to brain and nervous system, and respiratory disorders. TACs do not have ambient air quality standards because often no safe levels have been determined. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure.

The TACs of interest to this project are diesel particulate matter (DPM) and NOA. The Folsom Dam area has been identified as within an area where local geology supports the formation of NOA, although no NOA has been located within the project site.

Meteorology and Climate

The project is located at the southern end of the Sacramento Valley, which is characterized by hot, dry summers and mild, rainy winters. The surrounding mountains create a barrier to airflow that can trap air pollutants in the valley when meteorological conditions are right and a temperature inversion exists.

Air Quality

Within Sacramento County, on-road motor vehicles are the major source of ROG, CO, and NO_x emissions. Other equipment and off-road vehicles contribute substantially to ROG, CO, and NO_x emissions. Fugitive dust, generated from construction, roadways, and farming operations, is the major source of PM_{10} and, to a lesser degree, $PM_{2.5}$. Residential fuel combustion also substantially contributes to $PM_{2.5}$ emissions.

Based on 2008 to 2010 monitoring data of CO, O_3, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ collected at a monitoring station located 11 miles from the project site, CO, NO_2 and SO_2 in

Sacramento County did not exceed the applicable CAAQS and NAAQS, while O3, PM10 and PM2.5 did exceed the CAAQS and/or NAAQS.

Sensitive Receptors

Some locations are considered more sensitive to adverse effects from air pollution than others. These locations are termed sensitive receptors. A sensitive receptor is generally a location where human populations, especially children, seniors, and sick persons are found, and where there is a reasonable expectation of continuous human exposure according to appropriate standards (e.g., 24 hour, 8-hour, and 1-hour). Sensitive land uses and sensitive receptors generally include residents, hospital staff and patients, as well as school teachers and parents.

There are numerous sensitive receptors within 1,000 feet of the project area. Several residences to the west of Vogel Valley Road, Haley Drive, and E Hidden Lakes Drive are within 600 feet of Dikes 1, 2, and 3. Residences on Lake Court, Lakeshore Drive, and Sierra Drive are within 200 feet of Dike 4. Residences to the west of Auburn-Folsom Road are within 1,000 feet of Dike 5, parts of the Right Wing Dam, and just over 1,000 feet from Dike 6. Many residences just off of East Natoma Street are within 1,000 feet of Dikes 7 and 8.

Attainment Status

The General Conformity *de minimis* levels are based on the non-attainment and maintenance classification of the air basin. General conformity thresholds are for ozone precursors. The request for reclassification of the 8-hour ozone non-attainment area from “serious” to “severe” was granted by USEPA on June 1, 2010 and as a result, the GRC *de minimis* thresholds for ozone, VOC, and NOX reduced from 50 tons per year to 25 tons per year.

The Lower SVAB is designated as a “severe” non-attainment for the O3 NAAQS (for the 2008 8-hour O3 standard) and as non-attainment for PM2.5 NAAQS. In 2005, the 1-hour O3 NAAQS (established in 1997) was revoked and is no longer applicable. In 2015, the 8-hour O3 NAAQS was revoked and is no longer applicable. However, USEPA is in the process of reviewing CARB’s request, on behalf of SMAQMD, to formally designate the area as in PM10 attainment. The county is a designated maintenance area for the CO NAAQS. Sacramento County is in non-attainment for the O3, PM2.5, and PM10 CAAQS, and in attainment for all other criteria pollutants (CARB 2015; USEPA 2012a; USEPA 2012b).

Table 9. Criteria Pollutant Attainment Status.

County	Pollutant	National	State
Sacramento	1-hour Ozone	N/A[a]	Severe Non-attainment
	8-hour Ozone	Non-attainment	Severe Non-attainment
	CO	Unclassified/Attainment	Attainment
	PM10	Attainment	Attainment
	PM2.5	Non-attainment	Moderate Non-attainment
	SO_2	Unclassified	Attainment
	NO_2	Unclassified/Attainment	Attainment
	Pb	Unclassified/Attainment	Attainment
El Dorado	1-hour Ozone	N/A[a]	Severe Non-attainment
	8-hour Ozone	Non-attainment	Severe Nonattainment
	CO	Unclassified/Attainment	Unclassified/Attainment
	PM10	Unclassified	Non-attainment
	PM2.5	Moderate Non-attainment	Moderate Non-attainment
	SO_2	Unclassified	Attainment
	NO_2	Unclassified/Attainment	Attainment
	Pb	Unclassified/Attainment	Attainment
Placer	1-hour Ozone	N/A[a]	Severe Non-attainment
	8-hour Ozone	Non-attainment	Severe Non-attainment
	CO	Unclassified/Attainment	Unclassified/Attainment
	PM10	Unclassified	Non-attainment
	PM2.5	Unclassified/Attainment	Moderate Non-attainment
	SO_2	Unclassified	Attainment
	NO_2	Unclassified/Attainment	Attainment
	Pb	Unclassified/Attainment	Attainment

Source: Adapted from: California Air Resources Board 2013; U.S. Environmental Protection Agency 2015.
Notes: N/A = Not Available/Applicable
[a] The EPA revoked the 1-hour ozone standard on June 15, 2005.
[b] The EPA revoked the 8-hour ozone standard on April 6, 2015.

State Implementation Plans

Due to the nonattainment or maintenance area designations for SVAB discussed above, SMAQMD is required to prepare SIPs for O_3, PM10, and PM2.5, and a maintenance plan for CO. The status of these SIPs is summarized below (SMAQMD 2015).

- O_3: A final attainment designation for the 2008 O_3 NAAQS of 0.075 ppm has not been provided by USEPA and an attainment plan has not been prepared.

- PM10: USEPA is in the process of reviewing a maintenance plan and evaluating a CARB request to change the designation to attainment.

- PM2.5: SMAQMD prepared a PM2.5 attainment plan for submission in 2012. A final rule for Determination of Attainment was submitted July 2013 and the rule became final in August 2013.

- CO: A maintenance plan was approved by the USEPA in 2005 and is still applicable.

Air Emission Thresholds for Federal and Local Criteria Pollutants

The Federal standards and local thresholds for short-term construction projects in Sacramento, El Dorado, and Placer Counties are shown in Table 10 below. Local emissions are calculated per county and compared to their thresholds, whereas Federal standards look at the project emissions in total on an annual basis.

Table 10. Air Emission Thresholds for Federal and Local Criteria Pollutants.

Criteria Pollutant	Federal Standard (tons/year)	SMAQMD Threshold	El Dorado County APCD	Placer County APCD
NO_x	25***	85 lbs/day	82 lbs/day	82 lbs/day
CO	100	*23 mg/m^3 1-hour standard; 10 mg/m^3 8-hour standard	*AAQS	*AAQS
CO_2	None	1,100 metric tons/year		
PM_{10}	100	*50 µg/m^3 24-hour standard; 20 µg/m3 Annual Arithmetic Mean; 0 lbs/day *or* 80 lbs/day with BMPs **	*AAQS	82 lbs/day
$PM_{2.5}$	100	*35 µg/m^3 24-hour standard; 12 µg/m3 Annual Arithmetic Mean; 0 lbs/day *or* 82 lbs/day with BMPs **	*AAQS	82 lbs/day
ROG	25***	None	82 lbs/day	82 lbs/day

NO_x = nitrogen oxides	PM_{10} = particulate matter 10 micrometers or less
CO = carbon monoxide	$PM_{2.5}$=particulate matter 2.5 micrometers or less
SO = sulfur oxides	ROG = reactive organic gases

* = default to State standard (see California Ambient Air Quality Standards, Appendix B)
** = 0lbs/day threshold, with the caveate with BMPs standard is 80 lbs/day PM10 and 82 PM2.5
*** = rates for "severe" Federal nonattainment areas [*Federal Register* (40 CFR), 1993]
Source: SMAQMD, 2014

3.6.2 Environmental Consequences

Methodology

The methods for evaluating impacts are intended to satisfy the Federal and State air quality requirements, including the Federal General Conformity Rule, and to disclose effects for NEPA and CEQA.

In coordination with SMAQMD, the Road Construction Emissions Model, Version 7.1.5.1, was used to calculate construction emissions. Daily and totally project emissions were estimated from appropriate emissions factors using the model or USEPA AP-42 guidance, the type of equipment being operated, the level of equipment activity, and the associated construction schedules. The model's estimated criteria pollutants from a variety of constructed-related emission sources including mobile sources (trucks, worker vehicles, etc.), construction equipment, and/or fugitive dust sources. The following construction sources and activities were analyzed for emissions:

- Onsite construction off-road equipment emissions (all criteria pollutants)
- Onsite pickup trucks, onsite haul trucks, and off site haul trucks emissions (all criteria pollutants)
- Offsite worker vehicle emissions (all criteria pollutants)
- Onsite pickup trucks, onsite haul trucks, off site haul truck, and off site worker vehicles entrained fugitive dust emissions for paved and unpaved road entrained dust (PM10 and PM2.5)
- Onsite material storage piles handling and wind erosion (PM10 and PM2.5)
- Onsite excavation (cut/fill) fugitive dust (PM10 and PM2.5)

Borrow and disposal sites have not been identified at this time but are assumed to be located within a 30 mile radius from the project areas. Emissions associated with material borrow activities would fall within SMAQMD.

Basis of Significance

A project would significantly affect air quality if it would:

- Violate any ambient air quality standard;
- Contribute on a long-term basis to any existing or projected air quality violation;
- Expose sensitive receptors (such as schools, residences, or hospitals) to substantial pollutant concentrations; or
- Not conform to applicable Federal and State standards or local thresholds on a long-term basis.

3.6.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the project would not be constructed and there would be no construction-related effects on air quality in the project area. Air quality would continue to be influenced by climatic and geographic conditions, local and regional emissions from vehicles and households, and local commercial and industrial land uses. Air quality is expected to improve in the future based on the stricter standards implemented by CARB and SMAQMD. A possible flood event may temporarily increase the amount of vehicle emissions during flood-fighting activities, as well as increase the amount of vehicle emissions resulting from clean-up activities.

3.6.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

Short-term construction emissions were calculated by obtaining an estimated inventory of required construction equipment, the hours of operation, and the horsepower of each piece of equipment for each construction phase. The data was incorporated into the SMAQMD Road Construction Emission Model, Version 7.1.5.1, recommended by SMAQMD. Combustion emissions would result from the use of construction equipment, truck haul trips, and worker vehicle trips to and from the construction site. Exhaust emissions from these sources would include ROG, NOX, and PM10. Exhaust emissions would vary depending on the number and type of equipment, the duration of its use, and the number of construction worker and haul trips to and from the construction site. Combustion emissions from heavy equipment and construction worker commute trips would vary from day to day, and would temporarily contribute incrementally to regional ozone concentrations over the construction period.

Maximum daily emissions (lbs/day) and total construction emissions (tons/year) are estimated for ROG, NOX, PM10, and PM2.5 and GHG CO_2 (Climate Change Section 3.7) to evaluate emissions against SMAQMD, El Dorado, and Placer County thresholds. All emissions from activities associated with the implementation of Alternative 2 are shown in Appendix G and in Tables 11 -14 below, except for emissions related to AAQA, which require dispersion modeling. Dispersion modeling would be conducted with General Conformity.

Table 11. Unmitigated Alternative 2 Daily Emissions Summary (lbs/day).

Activity	Pollutant (lbs/year)				
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
2017 Total	4212	35911	20498	2184	6396
2018 Total	12917	127826	66674	58032	16692
2019 Total	19188	191599	112601	88171	24929
2020 Total	22370	232658	143426	273874	64210
2021 Total	11326	117998	76752	220022	49202
Project Total	70013	705994	419952	642283	161429
Daily Emissions, unmitigated (lbs/day)	45	453	269	412	103
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	0	0
Totals over Thresholds (lbs/day)	N/A	368	N/A	412	103

*Converted from threshold of 1,100 metric tons/year
** = 0lbs/day threshold, with the caveate with BMPs standard is 80 lbs/day PM10 and 82 lbs/day PM2.5
*** Model results were used for the CEQA effects analysis based on SMAQMD guidance). Total emissions were divided by total number of days in the construction period (1,560) to estimate the daily emissions (lbs/day)

Table 12. Unmitigated Alternative 2 Annual Emissions Summary (tons/year)

Activity	Pollutant (tons/year)					
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2
2017 Total	2	13	7	8	2	1,289
2018 Total	5	46	24	2	4	5,366
2019 Total	7	70	41	30	9	9,430
2020 Total	8	85	52	93	22	14,625
2021 Total	4	43	28	75	17	9,212
General Conformity *de minimis* levels	25	25	100	100	100	100

Table 13. Mitigated Alternative 2 Daily Emissions Summary (lbs/year)

Activity	Pollutant (lbs/year)				
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
2017 Total	1685	7182	8199	983	2878
2018 Total	5167	25565	26670	26114	7511
2019 Total	7675	38320	45040	39677	11218
2020 Total	8948	46532	57371	123243	28894
2021 Total	4530	23600	30701	99010	22141
Project Total	28005	141199	167981	289027	72643
Daily Emissions, mitigated (lbs/day)	18	91	108	185	47
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	80**	82**
Totals over Thresholds (lbs/day)	N/A	6	N/A	105	-35

*Converted from threshold of 1,100 metric tons/year.
** = 0lbs/day threshold, with the caveate with BMPs standard is 80 lbs/day PM10 and 82 lbs/day PM2.5
*** Model results were used for the CEQA effects analysis (based on SMAQMD guidance). Total emissions were divided by total number of days in the construction period (1,560) to estimate the daily emissions (lbs/day).
Source: Mitigation calculated using http://www.airquality.org/ceqa/ceqaguideupdate.shtml

Table 14. Mitigated Alternative 2 Annual emissions Summary (tons/year)

Activity	Pollutant (tons/year)					
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2
2017 Total	1	3	3	3	1	516
2018 Total	2	9	10	1	2	2146
2019 Total	3	14	16	13	4	3772
2020 Total	3	17	21	42	10	5850
2021 Total	2	9	11	34	8	3685
General Conformity *de minimis* levels	25	25	100	100	100	100

Construction emissions associated with Alternative 2 would last approximately 5 years. At the time of this analysis, this period begins in 2017 and ends in 2021. Daily emissions are exceeded for NO_x, CO_2, and PM levels in all five years of the project if unmitigated (Appendix G, Tables 11-14). Therefore, construction of the alternative would result in a significant effect if unmitigated. With the implemntations of BMPs, emissions would not be reduced below to below threshold levels, remaining a significant effect.

For the Folsom Dam Raise Project, the entire construction footprint of Dikes 1 through 8, the LWD, RWD, and MIAD, along with the Emergency Spillway, were analyzed under the CAA to determine the worst case scenario for air quality impacts. The analysis conducted determined that the emissions associated with construction of this action would be above the *de minimis* level-emission reductions were incorporated into the project analysis. Based upon preliminary analysis of air quality effects from the proposed action, it was evident that mitigated construction actions would result in exceeding SMAQMD standards for NOx, etc. It is likely that during the Project, sensitive receptors, such as residents within 1,000 feet of construction, will experience short-term increases in emissions of criteria pollutants. However; compliance with the CAA would be accomplished with the completion of a General Conformity Analysis, or with the inclusion in the State Implementation Plan, therefore, impacts to air quality would be less than significant with this mitigation.

General Conformity

The Federal CAA requires Federal agencies to ensure that their actions conform to applicable implementation plans for the achievement and maintenance of the NAAQS for criteria pollutants. To achieve conformity, a Federal action must not contribute to new violations of NAAQS, increase the frequency or severity of existing violations, or delay timely attainment of standards in the area of concern (for example, a state or a smaller air quality region). Federal actions need to demonstrate conformity to any State Implemenation Plan (SIP) of the regional air basin. Each action must be reviewed to determine whether it 1) qualifies for an exemption listed in the General Conformity Rule (GCR), 2) results in emissions that are below the GCR *de minimis* emissions thresholds, or 3) would produce emissions above the GCR *de minimis* thresholds applicable to the specific area.

The proposed action is located in an area with a designated Federal status of severe nonattainment for O_3 (8-hour standard). In addition the State has designated the area as nonattainment for PM_{10} and $PM_{2.5}$. As stated above, the proposed action would not be reduced below the USEPA's general conformity *de minimis* threshold. As a result, the Dam Raise would complete a general conformity determination (GCD) report. While the GCD is being prepared, all mitigation measures, including the ability to mitigate back to zero if thresholds are exceeded, would be required. The report would include project emission estimates in 2017 through the completion of the project in 2021, and would be completed prior to the start of construction in 2017.

3.6.5 Avoidance, Minimization, and Mitigation Measures

Combustion emissions would result from the use of construction equipment, truck haul trips to and from the borrow sites, and worker vehicle trips to and from the construction sites. The contractor would submit a list of vehicles to be used in the construction project for approval by USACE and SMAQMD. In order to achieve the required reductions in emissions, the following BMPs would be followed, in addition to the SMAQMD Guidance for Construction GHG Emissions Reductions (Section 3.7.5) (SMAQMD 2015b).

- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment would be checked by a certified mechanic and determined to be running in proper condition before it is operated.

- Use diesel-fueled equipment manufactured in 2003 or later, or retrofit equipment manufactured prior to 2003 with diesel-oxidation catalysts; use low-emission diesel products, alternative fuels, after-treatment products, and/or other options as they become available.

- Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) would be repaired immediately, and USACE and SMAQMD would be notified within 48 hours of identification of non-compliant equipment.

- Any remaining emissions over the GCR *de minimis* NO_x threshold would be reduced to zero through the purchase of offsets or other offsite mitigation. Additionally, any remaining emissions over the PM threshold would be reduced to zero through the purchase of offsets or other offsite mitigation. The contractor would be responsible for payment of any required mitigation and administrative fees.

- At least 48 hours prior to the use of heavy-duty, off-road equipment, the contractor would provide SMAQMD with the anticipated construction timeline including start date, and the names and phone numbers of the project manager and onsite foreman. SMAQMD and/or other officials may conduct periodic site inspections to determine compliance (SMAQMD 2015a). SMAQMD's Basic Construction Emissions Control Practices.

Basic Construction Emission Control Practices

The SMAQMD requires construction projects to implement basic construction emission control practices to control fugitive dust and diesel exhaust emissions. The Corps would comply with the following control measures for the project:

- Water all exposed surfaces twice daily. Exposed surfaces include but are not limited to: soil piles, graded areas, unpaved parking areas, staging areas, and access roads.

- Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would travel along freeways or major roadways should be covered.

- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt from adjacent public roads at least once a day. Use of dry power sweeping is prohibited.

- Complete all roadways, driveways, sidewalks, or parking lots to be paved as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.

- Minimize idling time either by shutting equipment off when not in use, or reducing the time of idling to 5 minutes [required by California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the site entrances.

- Maintain all construction equipment in proper working condition according to the manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

SMAQMD Exhaust Emission Mitigation Measures

SMAQMD recommends that the project implement a set of Enhanced Exhaust Control Practices to further reduce hydrocarbon emissions. The Enhanced Exhaust Control Practices that would be implemented by the contractor during construction include the following:

- Provide a plan for approval by the lead agency and SMAQMD demonstrating that the heavy-duty (50 horsepower [hp] or more) off-road vehicles to be used in the construction project, including owned, leased, and subcontractor vehicles, would achieve a project-wide fleet-average 20 percent NOX reduction and 45 percent particulate reduction compared to the most recent California Air Resources Board (ARB) fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available. The SMAQMD's Construction Mitigation Calculator can be used to identify an equipment fleet that achieves this reduction.

- Submit to the lead agency and SMAQMD a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 hp, that would be used an aggregate of 40 or more hours during any portion of the construction project. The inventory would include the horsepower rating, engine model year, and projected hours of use for each piece of equipment. The inventory would be updated and submitted monthly throughout the duration of the project, except that an inventory would not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty, off-road equipment, the contractor would provide SMAQMD with the anticipated construction timeline including start date, and the names and phone numbers of the project manager and onsite foreman. The SMAQMD's Model Equipment List can be used to submit this information.

- Ensure that emissions from all off-road diesel-powered equipment used on the project site do not exceed 40 percent opacity for more than three (3) minutes in any one (1) hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) would be repaired immediately. Non-compliant equipment would be documented and a summary provided to the lead agency and SMAQMD monthly. A visual survey of all in-operation equipment would be made at least weekly, and a monthly summary of the visual survey results would be submitted throughout the duration of the project, except that the monthly summary would not be required for any 30-day period in which no construction activity occurs. The monthly summary would include the quantity and type of vehicles surveyed as well as the date of each survey. The SMAQMD and/or other officials may conduct periodic site inspections to determine compliance. Nothing in this section would supersede other SMAQMD or State rules or regulations.

- If at the time of construction SMAQMD has adopted a regulation applicable to construction emissions, compliance with the regulation may completely or partially replace this mitigation. Consultation with the SMAQMD prior to construction would be necessary to make this determination.

SMAQMD Construction Area Particulate Matter Mitigation Measures

If the project's construction contractor determines that the construction activities would actively disturb more than 15 acres per day, then the contractor would be required to conduct PM10 and PM2.5 dispersion modeling. If that modeling shows violations of SMAQMD's PM10 or PM2.5 NAAQS thresholds, then the contractor would be required to implement sufficient mitigation (SMAQMD 2011) to avoid exceeding SMAQMD significance thresholds.

NO_X Mitigations Fee to SMAQMD

As of July 1, 2016, the mitigation fee rate is $18,260 per ton of emissions. The Contractor would provide payment of the appropriate SMAQMD-required NO_x mitigation fee to offset the project's NO_x emissions when they exceed SMAQMD's threshold of 85 lbs/day. Estimated calculations of emissions for these mitigation fees are included under the alternative's effects analysis in Appendix G. The NO_X mitigation fee applies to all emissions from the project: on-road (on and off site), off-road, portable, marine, and stationary equipment and vehicles.

3.7 Climate Change

3.7.1 Environmental Setting

Regulatory Setting

The following Federal, State, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations can be found in Chapter 5.0.

Federal

- Mandatory Greenhouse Gas Reporting Rule

State

- Assembly Bill 32, Global Warming Solutions Act of 2006
- California Clean Air Act of 1998
- Executive Order B-30-15
- Executive Order S-3-05
- Executive Order S-13-08
- Senate Bill 97
- Air Resources Board AB 32 Scoping Plan
- State Regulations on Greenhouse Gases and Climate Change

Local

- El Dorado County Air Quality Management District
- Placer County Air Pollution Control District
- Sacramento County Climate Action Plan
- Sacramento Metropolitan Air Quality Management District

Federal

On February 18, 2010, Council of Environmental Quality (CEQ) released the “Draft Guidance for GHG emissions and Climate Change Impacts” regarding the consideration of

GHGs in NEPA documents for Federal actions. The draft guidelines include a presumptive annual threshold of 25,000 metric tons of carbon dioxide equivalent (CO_2e) emissions from a proposed action to trigger a quantitative analysis (CEQ, 2010).

State

On June 1, 2005, Executive Order S-3-05 (E.O. S-3-05) was signed by Governor Arnold Schwarzenegger. "The order established greenhouse gas reduction targets, created the Climate action plan Team, and directed the Secretary of Cal/EPA to coordinate efforts with meeting the targets with the heads of other state agencies. The order also requires the Secretary to report back to the Governor and Legislature biannually on progress toward meeting the GHG targets, GHG impacts to California, and Mitigation and Adaptation Plans." (California Climate Change Portal, 2015)

The following year, the Global Warming Solutions Act of 2006, commonly referred to as Assembly Bill 32 (AB 32), required the California Air Resources Board (CARB) to develop regulations and policies to regulate sources of emissions of GHGs that cause global warming. CARB was directed to create a program that would reduce statewide emissions to 1990 levels by 2020, a reduction of approximately 21.7% below emissions expected under a "business as usual scenario." These reductions were to be met by adopting regulations that maximize feasible technology and are cost effective while improving efficiency in land use sectors (i.e. energy, transportation, waste).

In addition, AB 32 directed CARB to develop a scoping plan to help lay out California's strategy for meeting the goals. This scoping plan was to be updated every 5 years and would be funded through fees collected annually from large emitters of GHGs such as oil refineries, electricity power plants, cement plants, and food processors.

Senate Bill 97 (SB 97) approved by legislature in 2007, was an act relating to the California Environmental Quality Act (CEQA) that addressed GHGs. Specifically, SB 97 required Office of Planning and Research to prepare and develop proposed guidelines addressing the analysis and mitigation of greenhouse gases for the implementation of CEQA by public agencies. The Amendments to the CEQA Guidelines were adopted by the California Natural Resources Agency (formerly Natural Resources Agency) March 18, 2010.

Local

The local air quality districts within the project boundaries oversee air quality standards in their respective areas, and also provide guidance for addressing GHG emissions and mitigation in CEQA documents. While Placer and Eldorado air quality districts have not adopted thresholds of significance for GHGs, SMAQMD has. On October 23, 2014, SMAQMD adopted Resolution 2014-028 that established recommended thresholds for GHGs. Following in November 2014, SMAQMD updated Chapter 6 of SMAQMD's CEQA Guide to Air Quality

Assessment to provide guidance for agencies to specifically deal with GHG emissions, and included SMAQMD's recommended thresholds.

Potential Environmental Effects

Guidance released by CEQ regarding the consideration of GHG's in NEPA documents for Federal actions include a presumptive threshold of 25,000 metric tons of CO2e emissions from a proposed action to trigger a quantitative analysis (CEQ, 2010).

CEQA requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects they are considering for approval. CEQA requires that the cumulative impacts of GHG, even impacts that are relatively small on a global basis, need to be considered.

Existing Conditions

Warming of the climate system is now considered to be unequivocal (IPCC, 2007). Global average surface temperature has increased approximately 1.33° F over the last 100 years, with the most severe warming occurring in the most recent decades. In the 12 years between 1995 and 2006, 11 years ranked among the warmest years in the instrumental record of global average surface temperature (going back to 1850). Continued warming is projected to increase global average temperature between 2 and 11 °F over the next 100 years (IPCC 2007).

The causes of this warming have been identified as both natural processes and as the result of human actions. Increases in greenhouse gas (GHG) concentrations in the Earth's atmosphere are thought to be the main cause of human-induced climate change. GHGs naturally trap heat by impeding the exit of solar radiation that has hit the Earth and is reflected back into space. The six principal GHGs of concern are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

3.7.2 Environmental Consequences

Methodology

The proposed construction would use large, diesel-fueled construction vehicles during all phases of the project. The partial degrade of dike crowns would result in emissions from bulldozers and graders, as well as emissions from the haul trucks used to dispose of material. The construction of a concrete floodwall would result in emissions from haul trucks and other equipment, as well as the diesel-powered mixers required for the mixing of the cement. Diesel-powered cement mixers, pavers, and haul trucks for borrow materials would be used for the reconstruction of the dike crowns. Trucking material in from borrow sites for an earthen raise would increase the total GHG emissions for this project.

In addition to the construction vehicles, mixers, and haul trucks involved in the actual construction of the project, there would also be GHG emissions from the workforce vehicles. Workers would commute from their homes to the construction site and park in the staging area. Workers are assumed to commute no farther than 20 miles from the construction site based on the availability of housing and the urban setting of the project. During construction, there may be times when large construction vehicles on the roads slow regular traffic, increasing emissions from vehicles that use the roads on a regular basis.

The most recent version of the SMAQMD Road Construction Emissions Model (v. 7.1.5.1) now generates an output for CO_2. The SMAQMD Road Construction Emissions Model 7.1.5.1 (RCEM) was based on knowledgeable individuals from SMAQMD, California Department of Transportation (CalTrans), CARB, and the USEPA. The emissions model was updated by Tetra Tech in 2013 based on the original model prepared by Jones & Stokes (now part of Inner City Fund International [ICF]) and Rimpo and Associates, Inc., and used the 26th edition of Walker's Building Estimator's Reference Book (1999).

The Dam Raise includes five separate construction designs that would each be constructed during a 2 to 4 year duration and span for five consecutive years from 2017-2022. For each construction design, project parameters were directly input into the data section of the model which calculates emissions based on the size of the project area(s), amount of construction equipment, amount of workers required, and the amount of fill (i.e. soil, concrete, rock) to be transported per construction period (i.e. grubbing/land clearing, grading/excavation, drainage utilities/sub-grading, and paving). The RCEM creates default values based on the project parameters, and these values change to reflect the percentage, or amount of time each piece of equipment would be used during each construction phase.

Basis of Significance

It is unlikely that any single project by itself would have a significant impact on climate change. However, the cumulative effect of human activities has been linked to quantifiable changes in the composition of the atmosphere, which in turn have been shown to be the main cause of global climate change (IPCC, 2007).

SMAQMD developed recommended thresholds to allow review and assessment of about 90% of the projects in the district. For construction-only projects, the annual threshold is 1,100 Metric Tons CO_2 equivalents of per year (CO2e MT/year).

The proposed project could result in a significant impact if it generates GHG emissions:

(1) either directly or indirectly that may have a significant cumulative impact on the environment;

(2) that would conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases, including the State goal of reducing greenhouse gas emissions in California to 1990 levels by 2020, as set forth by the timetable established in AB 32, California Global Warming Solutions Act of 2006.

If a project's emissions exceed the thresholds of significance, then the project emissions may have a cumulatively considerable contribution to a significant environmental impact. If this were to occur, then all feasible mitigation would be implemented.

3.7.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the project would not be constructed and there would be no construction-related effects on climate change. Locally generated emissions, including levee operations and maintenance, would continue. However, a flood associated with a PMF event may result in large amounts of GHG emissions during flood-fighting activities, as well as large amounts of emissions resulting from clean-up activities and the repair and/or replacement of flood damaged housing, commercial and industrial properties, and public infrastructure.

3.7.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

Construction emissions associated with Alternative 2 would last approximately 4-5 years. At the time of this analysis, this period begins in 2017 and ends in 2021. In the SMAQMD, construction-related emissions under this action would exceed yearly emission thresholds for CO2 by approximately 172 metric tons in 2017, 3,870 metric tons in 2018, 7,557 metric tons in 2019, and 7,359 metric tons in 2021. Based on the estimated emissions, SMAQMD's GHG 1,100 MT CO2e threshold will be exceeded on an annual basis.

Table 15. Alternative 2 CO_2 Emissions in Tons and Metric Tons/Construction Project.

	2017	2018	2019	2020	2021
Tainter Gate	1,289.30	1,289.50	1,289.40	1,289.00	
Work Package 1 Earthen Embankment Raise		4,076.60	4,073.80		
Work Package 2 Earthen Embankment Raise (Excluding LWD and RWD)				4,647.30	4,636.40
Work Package 2 Concrete Floodwall for LWD and RWD				4,625.60	4,575.70
Work Package 3 Earthen Embankment Raise			4,067.00	4,063.20	
Total	1,289.30	5,366.10	9,430.20	14,625.10	9,212.10
SMAQMD Threshold of Significance	1,100	1,100	1,100	1,100	1,100
Amount Over Threshold of Significance (tons)	189.30	4,266.10	8,330.20	13,525.10	8,112.10
Amount Over Threshold of Significance (metric tons)	172	3,870	7,557	12,270	7,359

3.7.5 Avoidance, Minimization, and Mitigation Measures

The District provides recommended measures for reducing GHG emissions from construction activities. These recommended measures are best management practices and can be found further below in this section. In addition to implementation of BMPs, a GHG Mitigation plan would be implemented. The GHG mitigation plan would consist of feasible mitigation measures in which one mitigation measure or a multitude of mitigation measures can be implemented to reduce impacts to less than significant. To be considered less than significant, mitigation measures would need to reduce emissions to SMAQMD's threshold of significance of 1,100 MTCO2e on an annual basis. SMAQMD provides an example of potential mitigation methods, and feasible mitigation measures are discussed in more detail in the avoidance, minimization, and mitigation measures section (2014 SMAQMD):

- Measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision in which the plan or program provides specific requirements that would avoid or substantially lessen the potential impacts of the project;

- Offsite measures, including offsets, to mitigate a project's emissions;

- Measures that sequester greenhouse gases; and

- In the case of the adoption of a plan, such as a general plan, long range development plan, or GHG reduction plan, mitigation may include the identification of specific measures that may be implemented on a project by-project basis. A mitigation plan would be developed for the use of the Dam Raise Project by SMAQMD.

While the project won't necessarily sequester GHG emissions, the project would prevent extra carbon productions. Project emissions are short-term construction emissions, and the project is expected to have long-term benefits from the prevention of extra carbon production from the demolition, repair, and reconstruction of flood induced infrastructure losses associated with a catastrophic flood event. The short-term construction emissions are expected to be less than significant when averaged over the life span of the project and compared to the carbon production prevented from catastrophic flooding. In addition, BMPs would be incorporated in the design of the work and implemented by the contractor.

The Council on Environmental Quality (CEQ) released its Revised Draft Guidance for GHG Emissions and Climate Change Impacts in 2014. This guidance supersedes the 2010 guidance. The revised guidance includes a presumptive annual threshold of 25,000 MT of CO2e emissions from a proposed action to trigger a quantitative analysis. Unlike the 2010 draft guidance, the revised draft guidance applies to all proposed Federal agency actions, including land and resource management actions. This DSEIS/SEIR is a joint document and required under CEQA to fully analyze, quantify, and mitigate GHG impacts, and therefore is compliant with all NEPA requirements.

BMPs and the standard construction avoidance, minimization, and mitigation measures as recommended in the SMAQMD's "Guidance for Construction GHG Emissions Reductions" would be implemented to further reduce GHG emissions. In addition to implementing BMPs, the State would monitor emissions and implement all feasible mitigation measures. The following measures that could be implemented by the Contractor, the Corps, and/or the State will reduce GHG emissions levels back to less than significant and less than cumulatively considerable:

- Minimize the idling time of construction equipment to no more than 3 minutes, or shut equipment off when not in use;

- Maintain all construction equipment in proper working condition;

- Encourage carpools, shuttle vans, and/or alternative modes of transportation for construction worker commutes;

- Use locally sourced or recycled materials for construction materials as much as practicable;

- Develop a plan to efficiently use water for adequate dust control; and

- Implement a GHG reduction Plan. Feasible mitigation measures within the plan would be implemented if GHG emissions exceed 1,100 metric tons CO_2e/year. These measures could include:

    - Purchase of low carbon fuel

    - Purchase of CO_2 offsets to mitigate GHG emissions to less than 1,100 metric tons CO_2e/year. Potential offsets could be purchased from the following sources:
        - AB 32 U.S. Forest and Urban Forest Project Resources
        - AB 32 Livestock Projects
        - AB 32 Ozone Depleting Substances Projects
        - AB 32 Urban Forest Projects
        - Other-California Based Offsets
        - United States Based Offsets
        - International Offsets (e.g., clean development mechanisms)

    - Funding incentive programs from SMAQMD or supplementing existing programs such as Sacramento Emergency Clean Air Transportation (SECAT) program to obtain GHG reductions

    - Use of low carbon concrete if economically feasible and engineering feasible

Although construction of the alternative would result in a significant short-term increase in CO_2, this effect would be temporary. The long-term operations and maintenance of the project sites would remain the same with or without the project; therefore, the project would not increase emissions due to operations and maintenance. Long-term emissions would be the same with or without the project; maintenance emissions would be the same, and the cutoff wall itself has no net long-term emissions. This project does not conflict with any Statewide or local goals with regard to reduction of GHG. Any emissions exceeding SMAQMD thresholds will be reduced to less than significant; therefore, there would be no significant effects on climate change.

3.8 Aesthetics and Visual Resources

3.8.1 Environmental Setting

Regulatory Setting

There are no Federal or State laws regulating visual resources.

Existing Conditions

Folsom Reservoir is a significant visual feature in the regional landscape. The lake and shoreline contrast sharply with the nearby rolling, wooded foothills. Visual quality is highest in winter and spring when reservoir levels are high. As summer progresses, reservoir drawdown typically exposes a ring of bare soil along the shoreline, negatively affecting visual quality. Major viewer groups are the residents of nearby areas and recreationists using the reservoir and shoreline.

Downstream of Dikes 1 through 6 contains views of grasslands, oak woodlands, and wetlands. Several unimproved recreation trails are visible in the area. Auburn-Folsom Road is visible in some of these locations. The existing trail on top of Dikes 1 through 6 has views of Folsom Reservoir and the shoreline.

The areas surrounding Dikes 7 and 8 are similar to that of Dikes 1 through 6, only with some visibility from Folsom Lake Crossing and E. Natoma Street.

The LWD and RWD have little viewshed from any residential areas. Construction is ongoing near the LWD and spillway, where equipment and vehicles are visible throughout the week.

MIAD is currently under construction for ongoing USBR Dam Safety projects. Construction equipment and vehicles are visible throughout the week. Construction should be completed by December 2015. After construction, the construction zones would be hydroseeded, providing grassy and herbaceous plant growth within the viewshed.

3.8.2 Methodology and Basis of Significance

Methodology

Evaluation of the project's potential impacts on visual resources was based on a review of scenic vistas and landscapes that could be affected by project-related activities. Visual contrasts were examined, which included evaluations of changes in form, size, colors, project dominance, view blockage, and duration of impacts. Other elements, such as natural screening by vegetation or landforms, placement of project components in relation to existing structures, and likely viewer groups, were also considered.

Basis of Significance

The thresholds of significance encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and intensity. The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. A proposed alternative would result in a potentially significant impact to visual resources if it would:

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings.
- Substantially degrade the existing visual character or quality of the site and its surroundings.
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

3.8.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in construction of the proposed project and the visual resources around Folsom Reservoir would remain undisturbed. Dikes and dams would not be modified, and construction work, outside of routine maintenance and projects that are already underway or planned, would not contribute to any change in visual quality within the study area.

3.8.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

During the four year construction period of the emergency tainter gates, visual resources near the gates and dam structure itself may temporarily be impaired. However, at the time of this analysis, staging would be at the CCAO area yard, which is not a publically accessible or visible area. Therefore, construction-related effects on aesthetics and visual resources are considered less than significant because construction is temporary and existing views would not be obstructed.

The 3.5-foot raise of the dikes and dams, and other construction activities, may temporarily impair visual resources during each 2-year construction period of the various work packages. Increased construction traffic on Auburn-Folsom Road would affect views of the area from several homes across the street and may be visible by recreation users on the trails. The traffic light and/or flagmen and turning lanes, as well as construction vehicles, would be visible at certain times of the day. There may also be flashing lights to the north and south of the new traffic light to warn drivers of stopped traffic.

The existing trail on top of Dikes 4, 5, and 6 has views of Folsom Reservoir and the shoreline. During construction, recreationists would not have access to the trail on top of the dikes and would need to utilize the trail detour, which would not have views of the reservoir because of its location on the downstream side of the dikes. The trail detour would instead provide views of natural areas such as grasslands, oak woodland, and other habitats. Several unimproved recreation trails are visible in the area. The downstream side of Dike 5 contains mostly grasslands that extend to Auburn-Folsom Road. Existing trails cross through the proposed staging area at Dike 5. Auburn-Folsom Road is visible from the trails on the downstream side of Dike 5. Because the trail detour would be temporary and would still provide views of natural landscapes, no substantial adverse effects are expected to visual resources.

Raising the dams and dikes would not significantly affect the visual character of the FLSRA. Modifications to dikes and dams around Folsom Reservoir would occur in phases, limiting the extent of construction affecting viewsheds at any one time. The relatively small changes in the heights of these large linear features would not significantly alter the quality of views around the reservoir. Construction-related effects on visual resources near existing wing dams and dikes are considered less than significant because construction would be short in duration, the area disturbed would be relatively small, modifications would be limited to existing linear features, and existing views would not be obstructed.

There would be a temporary degradation of aesthetics/visual resources during construction, with an extended slight degradation of aesthetics/visual resources due to the removal of the Dike 7 Office Complex after the area is no longer used as a staging area.

However, with the removal of the Dike 7 Office Complex pavement and the subsequent restoration of habitat to the area, there would be long-term improvement of aesthetics/visual resources following project completion. Aesthetic impacts of this action were previously addressed in the 2012 SEIS/EIR and assessed in the 2016 Phase V SEA/EIR.

3.8.5 Avoidance, Minimization, and Mitigation Measures

- Modifications to dikes and dams around Folsom Reservoir would occur in phases, limiting the extent of construction affecting viewsheds at any one time.
- Measures would be incorporated into the project design to minimize effects on riparian vegetation and ensure use of appropriate erosion control methods, thereby lessening the visual effects of vegetation loss.
- Staging areas would be located throughout the project area on previously disturbed areas and their use would not constitute a substantial change from existing visual resource conditions.

3.9 Traffic and Circulation

3.9.1 Environmental Setting

Regulatory Setting

The following Federal, State, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations can be found in Chapter 5.0.

Federal

- Title 23 of the Code of Federal Regulations (CFR)
- Title 23 of the U.S. Code (USC)

State

- California Streets and Highways Code

Regional and Local

The Folsom Dam Raise Project study area includes roadways in the following jurisdictions:

- Counties – Sacramento, Placer and El Dorado (limited).
- Communities – Cities of Folsom, Roseville, and Community of Granite Bay.

The Sacramento Area Council of Governments (SACOG) serves as the area Metropolitan Planning Organization (MPO) for the region. Local municipalities determine their own criteria for streets and roads while the California Department of Transportation (Caltrans) oversees State highways.

Existing Conditions

This section describes the environmental setting as it pertains to transportation and circulation. Any incremental transportation impacts associated with implementation of the project are limited to the proposed construction years. The proposed project is expected to be under construction during calendar years 2017 through 2021. Therefore, the analysis years include all construction years from the project startup in 2016 to project completion in 2020, as well as the 2016 baseline conditions required by CEQA.

Folsom Dam is located in the City of Folsom (City) north of US Highway 50. Figure 21 shows the project vicinity map in context to the regional circulation system. The roadways within the study area of this DSEIS/SEIR are located within Sacramento County, Placer County, and to a limited extent, El Dorado County. Roadways under Caltrans' jurisdiction are also adjacent to the project area. Access points to the proposed work sites are restricted to the western and southern regions of Folsom Reservoir. Direct access to the project area is disseminated throughout the proposed project area. The figures in Appendix B show the proposed access points for the project area. Onsite haul routes are not discussed since they are not considered part of the public roadway system.

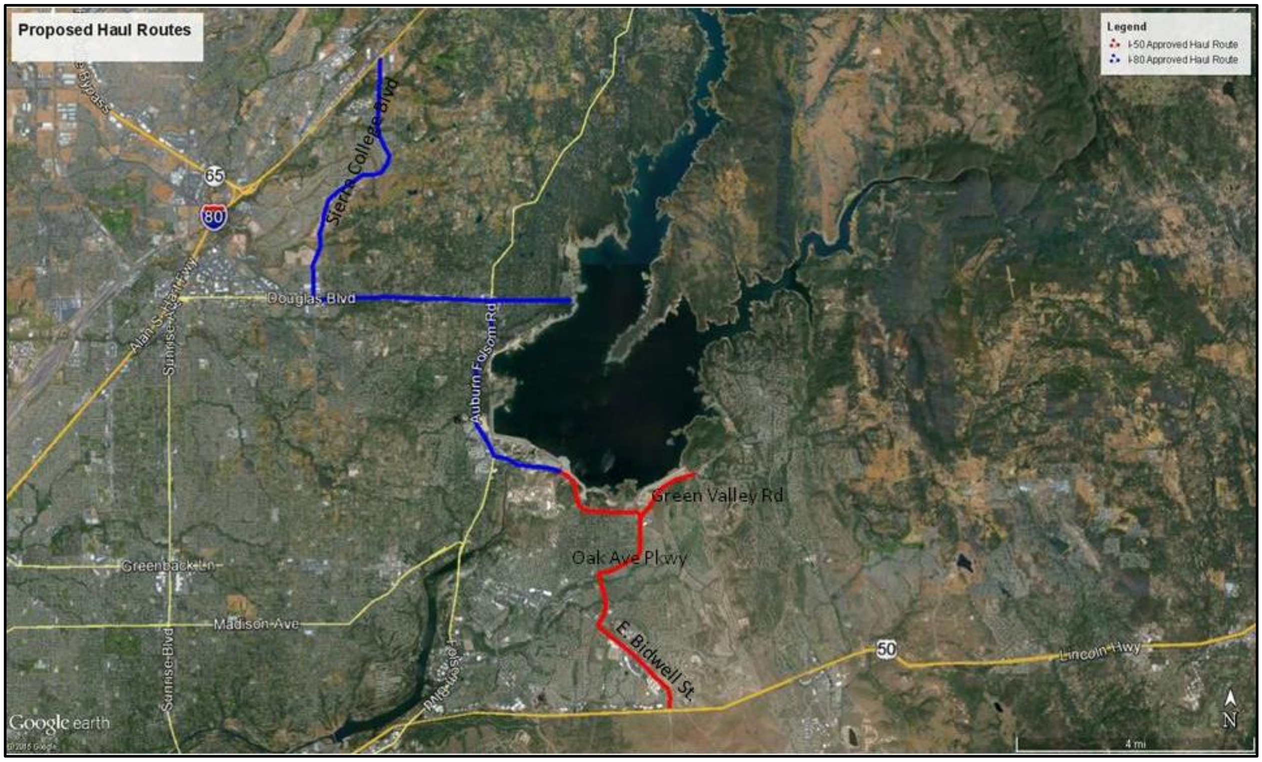

Figure 21. Proposed Folsom Dam Raise Project Haul Roads Vicinity Map.

The roadway network adjacent to the construction site is well-developed with multiple access patterns. There are two basic categories of traffic accessing the site, 1) daily workers and staff, and 2) material deliveries and hauling operations due to construction activities. It is assumed daily workers would commute locally via the adjacent roadway network, or use Highway 80 and Highway 50 to gain access to the site.

The area is considered to be primarily a suburban, low-density development to the east of Sacramento. Transportation facilities and services include interstate and State highways, local roads and streets, and local transit including local bus service and a light rail line from the City of Folsom to downtown Sacramento. A number of bicycle paths/routes accompany major roads. In addition, commuter bus services are provided by counties and cities within the area.

Functional Classification

Sacramento, Placer, and El Dorado Counties use a roadway classification system for long-range planning and programming. Roadways are classified based on the linkages they provide and their function, both of which reflect importance to the land use pattern, travelers, and general welfare. The functional classification system recognizes differences in roadway function and standards between urban/suburban and rural areas. The following paragraphs define the linkage and functions provided by each class:

- **Freeways:** Operated and maintained by Caltrans, these facilities are designed as high-volume, high-speed facilities for intercity and regional traffic. Access to these facilities is limited. In some cases, onramps and off-ramps are metered during peak-hours to reduce congestion caused by merging cars and trucks.

- **Arterials:** Major Arterials (four to six lanes) and Minor Arterials (four lanes) are the principal network for through-traffic within a community and often between communities.

- **Collectors:** These two-lane facilities function as the main interior streets within neighborhoods and business areas. Collectors serve to connect these areas with higher classification roads (i.e., freeways, arterials, and expressways).

- **Local Streets:** These facilities are two-lane streets that provide local access and service. They include residential, commercial, industrial, and rural roads.

<u>Level of Service</u>

To evaluate a roadway's operational characteristics, a simple grading system is used that compares the traffic volume carried by a road with that road's design capacity. A measure called "Level of Service" (LOS) is used to characterize traffic conditions. LOS is a measure of quality of operational conditions within a traffic stream based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six LOS from A (best) to F (worst), define each type of transportation facility (Table 16).

Table 16. Regulatory Criteria for Roadways and Intersections.

Level of Service (LOS)	Description of traffic conditions
A	Conditions of free flow; speed is controlled by the driver's desires, speed limits, or roadway conditions.
B	Conditions of stable flow; operating speeds beginning to be restricted; little or no restrictions on maneuverability from other vehicles.
C	Conditions of stable flow; speeds and maneuverability more closely restricted; occasional backups behind left-turning vehicles at intersections.
D	Conditions approach unstable flow; tolerable speeds can be maintained but temporary restrictions may cause extensive delays; little freedom to maneuver; comfort and convenience low; at intersection, some motorists, especially those making left turns, may wait through more than one or more signal changes.
E	Conditions approach capacity; unstable flow with stoppages of momentary duration; maneuverability severely limited
F	Forced flow conditions; stoppages for long periods; low operating speeds.

LOS thresholds are based on daily volumes, number of lanes, and facility type. These definitions and metrics are general transportation industry standards found in the Highway Capacity Manual (HCM), the American Association of State Highway and Transportation Officials (AASHTO) and the Institute of Transportation Engineers (ITE) guidelines and nomenclature. Table 17 (Roadway Functional Classification Thresholds) shows the relationship of LOS threshold for various roadway functional classifications.

Table 17. Roadway Functional Classification Thresholds.

Functional Class	Code	LOS Capacity Threshold (Total vehicles per day in both directions)				
		A	B	C	D	E
2-Lane Collector	2C	-	-	5,700	9,000	9,800
Minor 2-Lane Highway	MI2	900	2,000	6,800	14,100	17,400
Major 2-Lane Highway	MA2	1,200	2,900	7,900	16,000	20,500
4-Lane, Multilane Highway	MH4	10,700	17,600	25,300	32,800	36,500
2-Lane Arterial	2A	-	-	9,700	17,600	18,700
4-Lane Arterial, Undivided	4AU	-	-	17,500	27,400	28,900
4-Lane Arterial, Divided	4AD	-	-	19,200	35,400	37,400
6-Lane Arterial, Divided	6AD	-	-	27,100	53,200	56,000
8-Lane Arterial, Divided	8AD	-	-	37,200	71,100	74,700
2-Lane Arterial, moderate access control[1]	2AMD	10,800	12,600	14,400	16,200	18,000
4-Lane Arterial, moderate access control[1]	4AMD	21,600	25,200	28,800	32,400	36,000
6-Lane Arterial, moderate access control[1]	6AMD	32,400	37,800	43,200	48,600	54,000
4-Lane Arterial, high access control[1]	4AHD	24,000	28,000	32,000	36,000	40,000
6-Lane Arterial, high access control[1]	6AHD	36,000	42,000	48,000	54,000	60,000
4-Lane Freeway[2]	4F	22,200	40,200	57,600	71,400	80,200
4-Lane Freeway with Auxiliary Lanes[2]	4FA	28,200	51,000	72,800	89,800	100,700
6-Lane Freeway[2]	6F	33,300	60,300	86,400	107,100	120,300
6-Lane Freeway with Auxiliary Lanes[2]	6FA	42,300	76,500	109,200	134,700	151,050

Source: Transportation Research Board 2000
Notes:
(1) Used to analyze roadways within County of Sacramento. LOS Capacity Thresholds from Traffic Impact Analysis Guidelines, County of Sacramento, July 2004
(2) Includes mixed flow lanes only. HOV lanes and volumes are excluded from the analysis because a review of existing HOV counts and forecasts showed the HOV lanes to be operating under capacity.

The City of Folsom General Plan (1995) establishes LOS C as the minimum acceptable threshold for City roadways. The Sacramento County General Plan (2011) establishes LOS D as the minimum acceptable threshold for rural roadways, and LOS E for urban roadways. All of the Sacramento County roadways in the transportation study area are urban roadways. The Placer County General Plan (1994) establishes LOS C on rural, urban, and suburban roadways except within one-half mile of state highways where the standard is LOS D. The El Dorado County General Plan establishes LOS F as the acceptable threshold for county roads. The Community of Granite Bay establishes an LOS C (except for intersections along Auburn-Folsom Road south of Douglas Boulevard, and along Douglas Boulevard west of Auburn-Folsom Road where the standard is LOS E). The standards generally apply to projects that would create a permanent increase in traffic.

<u>Freeways</u>

There are two prominent freeways with the study area:

- Interstate 80 (I-80): I-80 is an east-west route but predominantly runs north-south within the study area. The study area for I-80 extends from Eureka Road to Sierra College

Boulevard. I-80 consists of six lanes, divided by barriers, within the analysis area with acceleration/deceleration lanes at the interchanges.

- U.S. Highway 50: The study area for Highway 50 runs from Hazel Avenue to El Dorado Hills Boulevard in a predominantly east-west direction. Highway 50 consists of four lanes with two carpool lanes, divided by barriers, within the analysis area with acceleration/deceleration lanes at the interchanges.

Bridges

The following bridges play a prominent role and serve as key linkages to the community within the project study area:

- Folsom Historic Truss Bridge: After its reopening to the public in 2000, the historic truss bridge is currently used as a recreational pedestrian and bicycle bridge. Its colorful history reflects the City's long dependence and appreciation for provided service since the 1800s.

- Rainbow Bridge (Greenback Lane): Directly below and south of Historic Truss Bridge, the Rainbow Bridge provides a more robust two-lane crossing that can handle cars and heavy vehicles. Although supplanted by wider bridges to the north and south, this attractive bridge with characteristic arches serves as a key signature symbol for Folsom.

- Lake Natoma Crossing Bridge: Completed in 1999, the Lake Natoma Crossing connects Folsom-Auburn Road from the north to Folsom Boulevard to the south. This has brought enormous relief to the community which endured long delays and congestion using Rainbow Bridge and the Folsom Dam Road when it was open to the public.

- Folsom Lake Crossing Bridge: Officially opened on March 29, 2009, the Folsom Lake Crossing Bridge is a modern concrete segmental bridge proving two travel lanes in each direction with Class 1 & 2 bicycle facilities. Situated below the Folsom Dam, this new bridge was constructed under the auspices of the Folsom Dam Raise Project, which is a component of the American River Watershed Long-Term Project.

Arterials, Collectors, and Local Roads by Jurisdiction

Table 18 below shows the roadway segments analyzed in each county. Project area roadways range from two to six lanes and have speed limits from 35 to 55 miles per hour. The project area roads provide access to the industrial and residential uses in the vicinity of the project.

Table 18. Roadway Segments.

Sacramento County	Functional Class	Capacity (LOS C/D/E)	Year 2015 Traffic Volumes	
			Traffic Volumes[2]	LOS
Folsom-Auburn Road – Folsom Lake Crossing to Greenback Lane	4AD	37,400	39,330	**F**
Folsom Boulevard – Greenback Lane to Iron Point Rd	4AD	37,400	45,603	**F**
Greenback Lane/Riley St – Natoma Street to Folsom Boulevard/Folsom Auburn Road	2A	18,700	56,590	**F**
Greenback Lane - Hazel Ave to Madison Ave	4AMD	36,000	29,075	D
East Natoma Street – Cimmaron Cir to Folsom Lake Crossing	4AU	28,900	20,027	D
East Natoma Street – Folsom Lake Crossing to Green Valley Rd	4AU	28,900	32,694	**F**
Oak Avenue Parkway – Blue Ravine Rd to East Bidwell St	6AD	56,000	26,783	C
East Bidwell Street – Clarksville Rod to Iron Point Rd	6AD	56,000	47,413	D
Blue Ravine Road – Oak Avenue Pwy to Green Valley Rd	4AD	37,400	23,525	D
U.S. 50 – Hazel Ave to Folsom Blvd	4FA	89,800	140,914	**F**
U.S. 50 - Folsom Blvd to East Bidwell St[1]	4F	71,400	119,439	**F**
U.S. 50 – East Bidwell St to County line[1]	4F	71,400	98,808	**F**
Folsom Lake Crossing Bridge	4AHD	40,000	31,850	C
I-80 – Douglas Blvd to Greenback Ln	6F	107,100	197,630	**F**
I-80 – south of Greenback Ln	6F	107,100	205,662	**F**
Douglas Boulevard – Barton Rd to Folsom-Auburn Rd	4AD	35,400	48,499	**F**
Douglas Blvd – Folsom-Auburn to Folsom Lake (To account for use of Park Drive)	4AU	14.500	7,900	A
Folsom-Auburn Road – Douglas Blvd to Lake Crossing	4AD	37,400	48,620	**F**
I-80 – north of Douglas Blvd	6F	107,100	197,630	**F**
U.S. 50 - Sacramento - El Dorado County Line1	4F	71,400	93,636	**F**
Greenvalley Road – East Natoma Street - Sophia Parkway	**4AU**	28,900	**38,609**	**F**

Source: Transportation Research Board 2000
Note: Year 2011 traffic volumes from the Folsom DS/FDR traffic analysis – calculated from 2010 ADT (Average Daily Traffic) with an annual 2% growth rate.
(1) Data obtained from Caltrans Traffic Data Branch – calculated from 2010 ADTs with an annual 2% growth rate.
(2) Data obtained from Folsom Dam Safety and Flood Damage Reduction Final EIS/EIR – calculated from 2007 ADTs with an annual 2% growth rate.

Bicycle and Pedestrian Facilities

Pedestrian facilities generally include sidewalks, crosswalks, curb ramps, pedestrian signals, and streetscape/landscape amenities (i.e., benches, tree-lined buffers, planters, bulb-outs, street lighting, etc.). There are existing bicycle lanes on several roadways in the vicinity of the proposed project. A Class II bicycle facility is an on-road, striped bicycle lane, and a Class III bicycle facility is an on-road, signed bicycle route.

Class II Bicycle Facilities

- *Douglas Boulevard* - Bicycle lanes are provided intermittently east of Eureka Road.

- *Auburn-Folsom Road/Folsom Boulevard* - Bicycle lanes are provided in the City of Folsom north of Greenback Lane/Riley Street and south of Sutter Street.

- *Natoma Street* - Bicycle lanes are provided from Folsom Boulevard to east of Mill Street, and between Prison Road and Ranch Drive. The City of Folsom Bikeway Master Plan proposes to connect these two segments so the bicycle lanes would eventually run continuously between Folsom Boulevard and Green Valley Road.

- *Green Valley Road* - Bicycle lanes are provided from north of Natoma Street to the Sacramento County line. The Bikeway Master Plan proposes to connect these bicycle lanes with existing lanes on Blue Ravine Road south of Natoma Street.

Class III Bicycle Facilities

- *Auburn-Folsom Road* - There is a bicycle route between the Sacramento County line and Douglas Boulevard.

Transit Service

Public transportation within the proposed project vicinity is provided via bus and light rail service. Bus service within the City of Folsom, the City of Roseville, Sacramento County, and Placer County is primarily provided by Folsom Stage Line, Roseville Transit, Sacramento Regional Transit, and Placer County Transit, while light rail transit is provided by Sacramento Regional Transit.

3.9.2 Environmental Consequences

Methodology

Traffic effects associated with the project were evaluated in two ways: (1) regarding average daily traffic, and (2) in terms of specific time periods during the day (*i.e*., hourly basis, as needed). The analysis is based on the following criteria:

- The construction schedule would be up to 10 hrs a day, up to 6 days per week.
- Material hauling activity would occur within normal work hours, from 7am to 7pm.
- Equipment hauling activity would occur during normal work hours, from 7am to 7pm.

All material necessary for each alternative would be obtained from an established borrow site within 30 miles of the proposed project site. As specific borrow locations are not known at this time, subsequent CEQA and NEPA documentation may be necessary to evaluate the impacts associated with material hauling. However, haul trucks would use existing county and city designed haul truck routes and approved and established haul routes described in this document.

Haul trucks and staff vehicles are expected to access the site via one of two predetermined, approved haul routes, one from I-80 and one from Highway 50 (Figures 19 and 20). For Alternative 2, the proposed route is originating from I-80, proceeding south to Sierra College Boulevard, east on Douglas Boulevard following Douglas Blvd into the project site. The route originating from Highway 50 would be via East Bidwell Street, Oak Avenue, Blue Ravine Road, to East Natoma Street, to Folsom Lake Crossing and vice-versa (for Alternative 2). The aforementioned project haul routes are consistent with city and county designated truck routes. Additionally, no trucks are allowed to use Auburn-Folsom Road north of Douglas Boulevard.

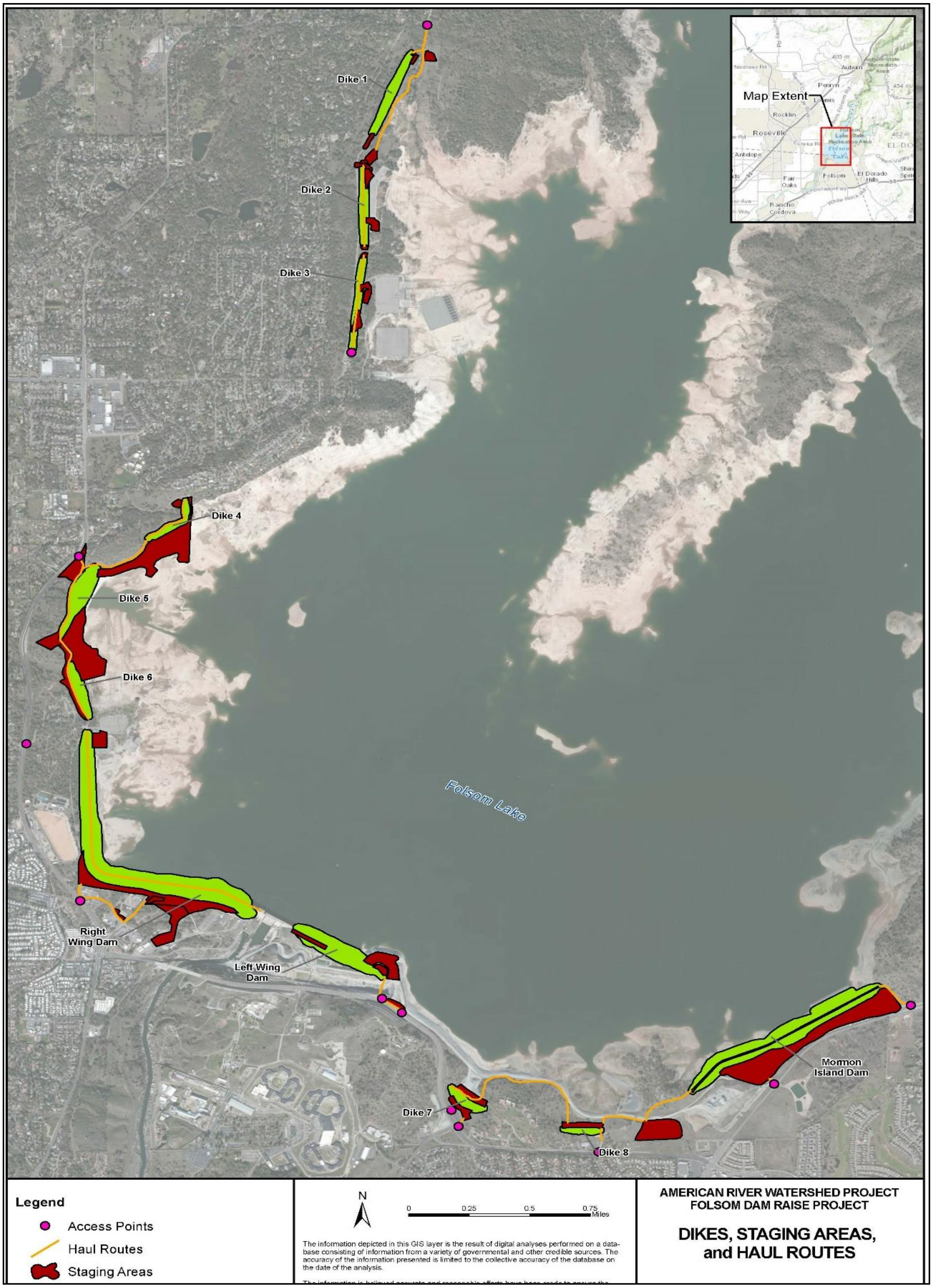

Figure 22. Folsom Dam Raise Project Proposed Staging Areas and Haul Roads.

To account for the large percentage of heavy trucks associated with typical construction projects, the Institute of Transportation Engineers recommends a threshold level of 50 or more new peak-direction trips during the peak hours. Therefore, an alternative would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity, and result in a significant impact related to traffic, if it would result in 50 or more new truck trips during the morning or evening peak hours.

Basis of Significance

Adverse effects on traffic and circulation are considered significant if an alternative would result in any of the following:

- Substantially increase traffic in relation to existing traffic load and capacity of the roadway system;
- Substantially disrupt the flow and/or travel time of traffic;
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities;
- Result in inadequate emergency access;
- Reduce supply of parking spaces sufficiently to increase demand above supply;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in a safety risk; or
- Substantially increase hazards due to design feature (e.g. sharp curves or dangerous intersection) or incompatible uses.

3.9.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in construction of the proposed alternatives; therefore, the project would not create additional traffic during construction around the proposed project area. The existing roadway network, types of traffic, and circulation patterns is expected to increase traffic by 2% each year.

3.9.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

The existing access into the construction site for the emergency spillway modification portion of Alternative 2 is via the intersection along Folsom-Auburn Road and Folsom Dam Road, or from Folsom Lake Crossing. Access from the first point allows vehicular access to RWD; however, this access is restricted to limited use. Access from the second point, off Folsom Lake Crossing and across the LWD, would be the primary access to the dam for the tainter gate refinements. Table 19 details direct access roads for each proposed project feature.

Table 19. Spillway Modification Access Routes.

Direct access Route	Access Area	Facility/Structure
Auburn-Folsom Rd	Beal's Point	Tainter Gate Refinements
Folsom Dam Road, Folsom Lake Crossing	Main Concrete Dam	Tainter Gate Refinements

One lane would be open to traffic across the main Folsom Dam structure at all times during the construction period; however, the traffic lane would not need to be continuous across the dam so long as a vehicle (auto/pickup) can navigate from one side to the other. Coordination with USBR on use of the Main Dam road is ongoing on this subject.

Truck trips would involve hauling materials through residential areas; however, proposed routes are on designated haul roads. Additionally, proposed haul routes occur in the vicinity of schools throughout the project area. When possible, construction schedules would avoid routes that impact schools during the school year.

Vehicle trips to Folsom Dam from the surrounding area would increase slightly as a result of labor force trips and haul truck trips. It is anticipated that 67 haul truck trips would be required over the duration of construction, beginning calendar year 2016 and lasting approximately four (4) years. Approximately 54 workers are estimated to commute to and from the project six (6) days a week, resulting in a total of 134,784 worker commuter trips over the duration of construction, beginning calendar year 2016 and lasting approximately 4 years (Table 20). Therefore, 134,851 total truck trips are associated with the tainter gate aspect of Alternative 2.

Transportation and circulation effects resulting from this action are temporary in nature and would not result in permanent traffic increases to the surrounding area. The action would not create 50 or more new truck trips during peak travel hours (7AM to 8AM and 5PM to 6PM), as workers would be arriving and leaving onsite between 7am and 7pm. Employee commuter trips and haul truck trips would not result in a deterioration of existing LOS values, nor substantially disrupt the flow and/or travel time of traffic on public roadways or on Highways 50 and 80. Labor force trips and haul truck trips would not conflict with adopted plans or policies that effect public transit, bicycle, or pedestrian facilities, nor would it conflict with emergency access. Therefore, this portion of Alternative 2 would result in less than significant impacts on transportation and circulation resources.

To access Dikes 1 through 3, construction vehicles could access the project area at the Granite Point entrance. This impact to residential areas is temporary and less than significant. The traffic patterns in and around the project area would not change as a result of construction of the dam raise project.

Table 20. Hauling and Worker Truck Trips for Spillway Modification Portion of Alternative 2.

Component	Total Hauling Truck Trips	Total Worker Commuting Truck Trips	Total Truck Trips
Alternative 2: Replacement of Emergency Tainter Gates	67	134,784	134,851

Direct access routes to the construction sites for the 3.5-foot raise of the Dikes, wing dams, and MIAD is via Douglas Boulevard, Auburn-Folsom Road, Folsom Dam Road, E. Natoma Street, and Green Valley Road (Table 21). Access from these points also allows vehicular access to the primary staging areas.

Table 21. Access Routes for the 3.5-Foot Dam Raise Portion of Alternative 2.

Direct Access Route	Access Area	Facility/Structure
Douglas Boulevard	Granite Bay	Dikes, 1, 2, and 3
Auburn-Folsom Rd	Beal’s Point	RWD
Auburn-Folsom Rd	Unnamed road between Bell Drive and Country Ct	Dikes 4, 5, and 6
Folsom Dam Road, Folsom Lake Crossing	Main Concrete Dam	LWD, RWD
E Natoma Street	Folsom Point	LWD, Dikes 7, 8, MIAD
Green Valley Road	MIAD	MIAD

Construction of this portion of Alternative 2 would have temporary direct effects on the traffic and circulation in the project area. Traffic generated by the proposed action would result in growth in two categories: (1) labor force accessing the project site on a daily basis, and (2) truck trips due to the import of material and equipment for the earthen raise. New trips have been determined by calculating the number of trips generated by the quantity of materials and equipment deliveries required for the project construction, as well as trips generated by construction labor forces. Construction labor force is estimated as round-trips per day, while haul truck trip is estimated as total trips over the construction duration of each Work Package (approximately 2 years). Table 22 illustrates these values. The traffic numbers developed are maximum amounts of traffic volumes based on anticipated work schedules and activities.

Direct access to the proposed work site would vary by project feature/Work Package and are detailed in Table 21 above. It is anticipated that these roads would be used by workers accessing LWD, RWD, MIAD and Dikes 1 through 7. Figure 22 illustrates the routes that are proposed to be used for providing equipment, workers, and materials for the alternatives. Staging areas are on Reclamation's work yard just south of the RWD and site access is off Folsom-Auburn Road through Reclamation's Central California Area Office (CCAO), both of which are not public accessible roads.

A paved road for vehicles exists on the crest of Dikes 1 through 3 and would need to be closed during construction of the earthen raise (approximately 2 years); therefore, a detour road would be constructed to maintain public access to the park roadway system. Public vehicle access is not permitted on the crests of Dikes 4 through 8, or the RWD and LWD.

It is estimated that approximately 15,620 truck trips would be necessary for material and equipment hauling for this alternative during construction (2017 – 2020). Approximately 27 workers are estimated to commute to and from the project 6 days a week for a total of 624 days in the project lifetime, adding up to 101,088 worker commuter trips. Therefore, 116,709 total trips are associated with this alternative.

Table 22. Total Truck Trips for the 3.5-Foot Dam Raise portion of Alternative 2.

Component	Total Hauling Truck Trips (20cy per truck)	Total Worker Commuting Truck Trips	Total Truck Trips
WP1 Earthen Embankment Dikes 4-6	3,121	33,696	36,817
WP 2 Earthen Embankment dikes 7, 8, and MIAD, Concrete wall for LWD and RWD	9,731	33,696	43,427
WP3 Earthen Embankment	2,768	33,696	36,464
Total	15,621	101,088	116,709

The increased traffic associated with construction will not eliminate any known emergency access routes and will not affect emergency access. Construction workers would park in designated locations and would not reduce the supply of parking spaces. Air traffic patterns would not be affected, design features do not include any changes to traffic design, and no increase in hazards would occur. However, the implementation of this portion of Alternative 2 would substantially increase traffic in relation to existing traffic load and capacity of the roadway system and has the potential to substantially disrupt the flow and/or travel time of traffic. Therefore, potential traffic effects resulting from this action would be significant and unavoidable.

3.9.5 Avoidance, Minimization, and Mitigation Measures

The effects are identified as significant and unavoidable, however, the following measures would be implemented to avoid or minimize any effects, as well as ensure public safety on area roadways:

- The construction contractor would be required to prepare a traffic management plan, outlining proposed routes to be approved by the appropriate agencies, and implement the plan prior to initiation of construction.

- High collision intersections would be identified by the appropriate local entity, and avoided if possible.

- Construction and haul drivers would be informed and trained on the various types of haul routes, and areas that are more sensitive (e.g., high level of residential or education centers, or narrow roadways).

- The construction contractor would develop and use signs to inform the public of the haul routes, route changes, detours, and planned road closures to minimize traffic congestion and ensure public safety.

3.10 Noise

3.10.1 Environmental Setting

Regulatory Setting

- City of Folsom Noise Ordinance
- Noise Control Act of 1972, as amended (42 U.S.C. 4901 et seq.)

Existing Conditions

Federal and state governments provide guidelines for construction noise in regards to worker protection and, for this project, traffic noise. The proposed project is located in the vicinity of four convergent jurisdictions: the City of Folsom, Sacramento County, Placer County, and El Dorado County. Construction noise from the project may impact noise sensitive receptors in each of these four jurisdictions. These noise sensitive receptors consist of both human receptors and wildlife receptors. There are no established criteria available for the wildlife species known to occur in the project area. Many regulatory agencies recommend using 60 dBA Leq hourly levels as the threshold for determining significant impacts for sensitive bird species at the edge of suitable habitat.

The City of Folsom's noise standards would be applied to this project because it is the closest jurisdiction with the most restrictive noise ordinance. The local noise standards for Sacramento County, Placer County and El Dorado County can be found in Appendix H. Compliance with the City of Folsom standards would assure compliance with all other local noise standards. The noise ordinance standards for the City of Folsom are listed in Table 23, and are based on the L50 metric as the baseline criterion level.

Table 23. City of Folsom Noise Ordinance.*

			Noise Levels Not To Be Exceeded In Residential Zone**	
Exterior Noise Standards	**Maximum Time of Exposure**	**Noise Metric**	**7 am to 10 pm (daytime)**	**10 pm to 7 am (nighttime)**
	30 Minutes/Hour	L_{50}	50 dBA	45 dBA
	15 Minutes/Hour	L_{25}	55 dBA	50 dBA
	5 Minutes/Hour	$L_{8.3}$	60 dBA	55 dBA
	1 Minute/Hour	$L_{1.7}$	65 dBA	60 dBA
	Any period of time	L_{max}	70 dBA	65 dBA
Interior Noise Standards				
	5 Minutes/Hour	$L_{8.3}$	45 dBA	35 dBA
	1 Minute/Hour	$L_{1.7}$	50 dBA	40 dBA
	Any period of time	L_{max}	55 dBA	45 dBA

*Construction Noise Exemption Times: 7:00 a.m. – 6:00 p.m. Weekdays, 8:00 a.m. – 5:00 p.m. Weekends
**5 dBA reduction for impact noise during non-exempt times SOURCE: City of Folsom, CA Municipal Code. Chapter 8.42

Construction noise is exempt from these standards during the periods of 7:00 a.m. to 6:00 p.m. on weekdays and 8:00 a.m. to 5:00 p.m. on weekends. If construction occurs outside of these periods, measures would be required to comply with exterior and interior noise limits at residential receptors. In the event that the measured ambient noise level exceeds the applicable noise level standard, the applicable standard would be adjusted so as to equal the ambient noise level. For impulse noise (such as impact pile driving or blasting), the limits are reduced by 5 dBA in the noise ordinance.

Background sound levels for residential areas are typically in the range of 40–60 dBA. This analysis assumed an average background noise level of 50 dBA. However, ongoing construction projects, such as the auxiliary spillway construction and current MIAD work would have an impact on this ambient noise level for the tainter gate work, Dikes 7 and 8, MIAD, and the LWD and RWD. For the most part, the ambient noise for Dikes 1 through 6 would typically be in the range of 40-60 dBA.

3.10.2 Environmental Consequences

Methodology

Noise effects were evaluated for each construction site by comparing the expected project-generated construction noise levels with existing noise levels while taking into account the locations of sensitive receptors, and the noise criteria and standards set forth in applicable laws and regulations. A reasonable worst-case assumption is that the three loudest pieces of equipment would operate simultaneously and continuously over at least a one-hour period. Because the average background noise level in residential areas is estimated to be 50 dBA, a construction-related increase in noise to levels above 60 dBA would represent a significant effect.

Construction noise may potentially impact five jurisdictions (City of Folsom, Granite Bay, and unincorporated areas of Sacramento, El Dorado, and Placer Counties). These jurisdictions either have non-transportation noise standards based on time of day and land use sensitivity, or provide exemptions for construction as long as those activities occur during the daytime. Residential areas are considered the most noise-sensitive land use and have the strictest noise standards.

Table 24. Non-Transportation Noise Standards in the Relevant Jurisdictions.

Local Government Non-Transportation Standards (dBA)						
Noise Element Jurisdiction/ Land Use Category	**Maximum Allowable Exterior Noise Levels**					
	Daytime (7am-7pm)		**Evening (7pm-10pm)**		**Nighttime (10pm-7am)**	
Sacramento County	Hourly		Hourly		Hourly	
	L_{50}	L_{max}	L_{50}	L_{max}	L_{50}	L_{max}
Residential Areas	50	70	50	70	45	65
City of Folsom [3,4]	Hourly L_{eq}				Hourly L_{eq}	
	50				45	
El Dorado County [1]	Hourly		Hourly		Hourly	
	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
Residential Areas (Community Areas)	55	75	50	65	45	60
Residential Areas (Rural Regions)	50	60	45	55	40	50
Commercial Areas (Community Areas)	70	90	65	75	65	75
Commercial Areas (Rural Regions)	65	75	60	70	60	70
Open Space, Natural Resource (Rural Regions)	65	75	60	70	60	70
Placer County[2] including Granite Bay Community			L_{dn}			
Residential			50			
Resident Areas adjacent to Industrial			60			
General Commercial			70			
Heavy Commercial/Industrial Park			75			
Recreation and Forestry			70			
All land uses interior allowable noise level			45			

Notes

[1] Non-transportation construction noise standards

[2] Single event impulsive noise levels produced by blasting shall not exceed a peak linear overpressure of 122 dB, or a C-weighted Sound Exposure Level (SEL) of 98 dBC. The cumulative noise level from blasting shall not exceed 60 dB LCdn or CNELC on any given day.

[3] Construction noise is exempt from the City of Folsom Noise Element provided that construction does not take place before 7 a.m. or after 6 p.m. during weekdays and before 8 a.m. or after 5 p.m. on weekends.

[4] Based on cumulative 30 minutes in any one-hour time period.

Sources

County of Sacramento General Plan Noise Element (December 1993, amended 1998)

City of Folsom Municipal Code, Chapter 8.42 Noise Control

El Dorado County General Plan, Public Health, Safety and Noise Element (July 2004)

Placer County General Plan Update, Section 9 Noise (August 1994)

Granite Bay Community Plan Noise Element (Amended 1996)

Construction activity noise levels at and near the project areas would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate impulsive noises (such as pile driving or blasting), which can be particularly annoying. Table 25 shows typical noise levels during different construction stages. Table 26 shows typical noise levels produced by various types of construction equipment.

Table 25. Typical Construction Noise Levels.

Construction Phase	Noise Level (dBA, Leq)[a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

[a] Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.
Source: EPA, 1971.

Table 26. Noise Emission Levels Typical for Construction Equipment.

Equipment	Typical Noise Level (dBA) 50 feet from Source
Backhoe	80
Bulldozer	85
Compressor	81
Generator	75
Grader	85
Jackhammer	90
Loader	85
Roller	75
Scraper	89
Truck	88

Source: Federal Highway Administration 1995 and Reagan and Grant 1977.

A reasonable worst-case assumption is that the three loudest pieces of equipment would operate simultaneously and continuously over at least a one-hour period. The combined sound level of three of the loudest pieces of equipment listed in Table 26 (jackhammer, scraper, and truck) is 94 dBA measured at 50 feet from the source. Table 27, which assumes this combined source level, summarizes predicted noise levels at various distances from an active construction site. The data shown in the table indicates that the 60 dBA threshold would be exceeded up to 2,000 feet from the point the noise is generated. These estimations of noise levels take into account distance attenuation, attenuation from molecular absorption, and anomalous excess attenuation (Hoover 1996).

Table 27. Estimated Construction Noise in the Project Area.

Distance Attenuation	
Distance to Receptor (feet)	**Sound Level at Receptor (dBA)**
50	94
100	88
200	82
400	73
600	72
800	69
1000	66
1500	62
2000	59
2500	56
3000	53
4000	49
5280	45
7500	38

*This calculation assumes simultaneous operation of one jackhammer, one truck, and one scraper.

The results in Table 27 above indicate the potential for residences within about 2,000 feet of active construction sites to be exposed to substantial increases in noise, assuming a background sound level of 50 dBA.

Basis of Significance

Adverse effects on noise and vibration are considered significant if an alternative would result in any of the following:

- Exposure to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Substantial (10 dB or greater) long-term increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or,
- Exposure of sensitive receptors or structures to groundborne vibration.

3.10.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in the proposed project. As a result, there would be no construction-related effects to the acoustic environment, including the generation of groundborne vibration. The noise levels in the study area would remain consistent with the existing ambient noise levels present under current conditions. Sources of noise and noise levels would continue to be determined by local activities, development, and natural sounds.

3.10.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

The nearest noise receptors to Folsom Dam are the Reclamation (USBR) offices on the north side of the dam. The closest USBR office is approximately 1,000 feet away from the main dam (Figure 23). The replacement of the emergency tainter gates is expected to result in an increase in ambient noise levels at the USBR's and DPR's offices because of the close proximity of the proposed roadway to these buildings. Additionally, a portion of the Folsom State Prison complex just across Folsom Lake Crossing road is within 2,000 feet of the main concrete dam. Because this area is immediately adjacent to a main road, the ambient noise level in the background would be higher than 60 dBA. Therefore, temporary noise effects associated with raising and modifying Folsom Dam would be considered less than significant as the distance between noise sources and potential receptors is large enough to attenuate noise.

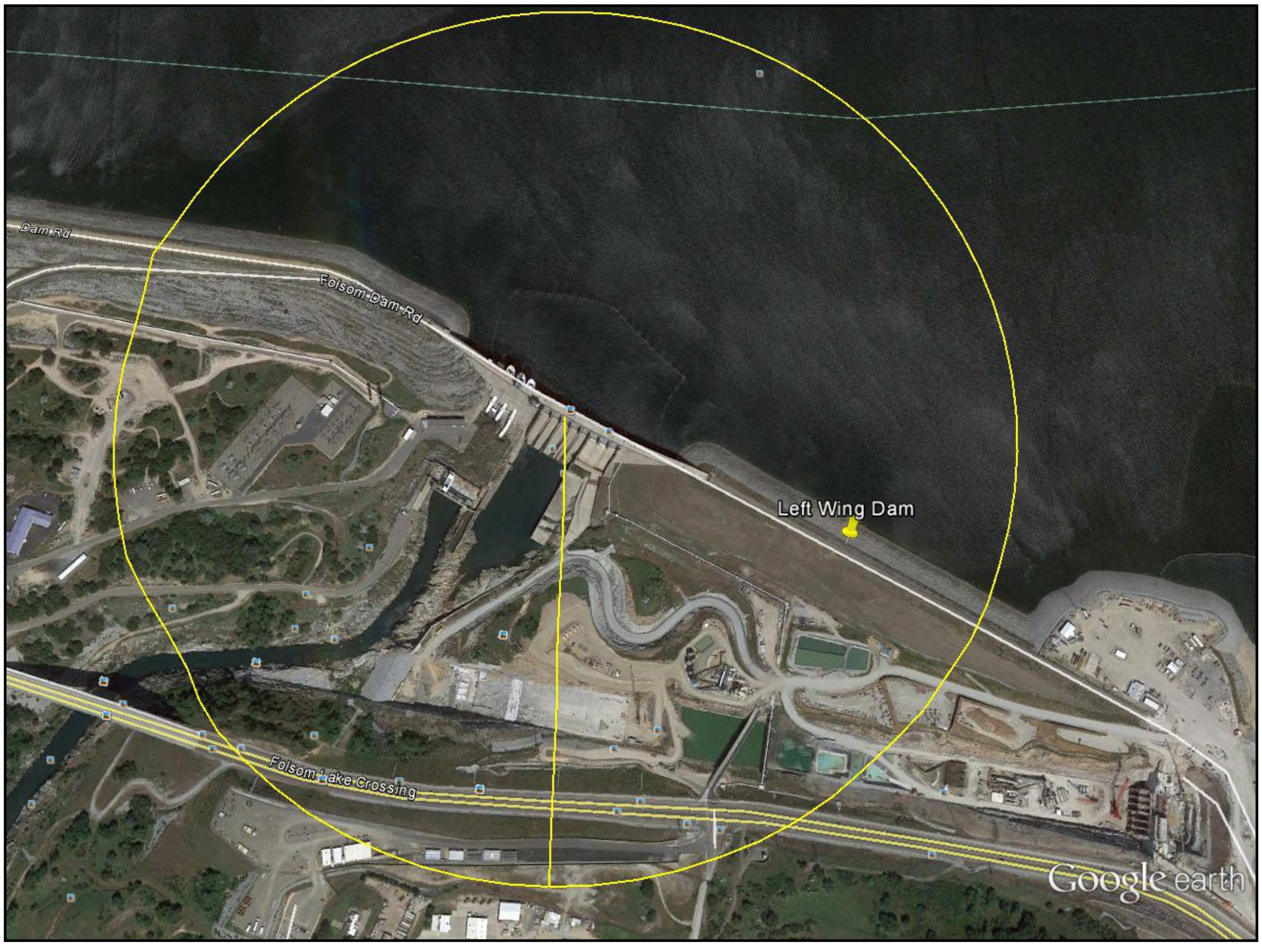

Figure 23. 2,000 Foot Buffer around Folsom Main Dam.

There are several sites where sensitive noise receptors are located near the proposed construction areas for this portion of Alternative 2. Operation of heavy equipment over the maximum construction duration (2 years for each work package, as previously described), within 2,000 feet of sensitive receptors, would result in a substantial increase in the ambient noise level exceeding the estimated background level of 50 dBA.

Dike 1. Residences to the northwest of Vogel Valley Road are within 500 to 600 feet of Dike 1. Residences on Christian Lane are less than 900 feet away from Dike 1. Additionally, numerous residences near the confluence of Boulder Road and Twin Rocks Road are within 2,000 feet of Dike 1 (Figure 24).

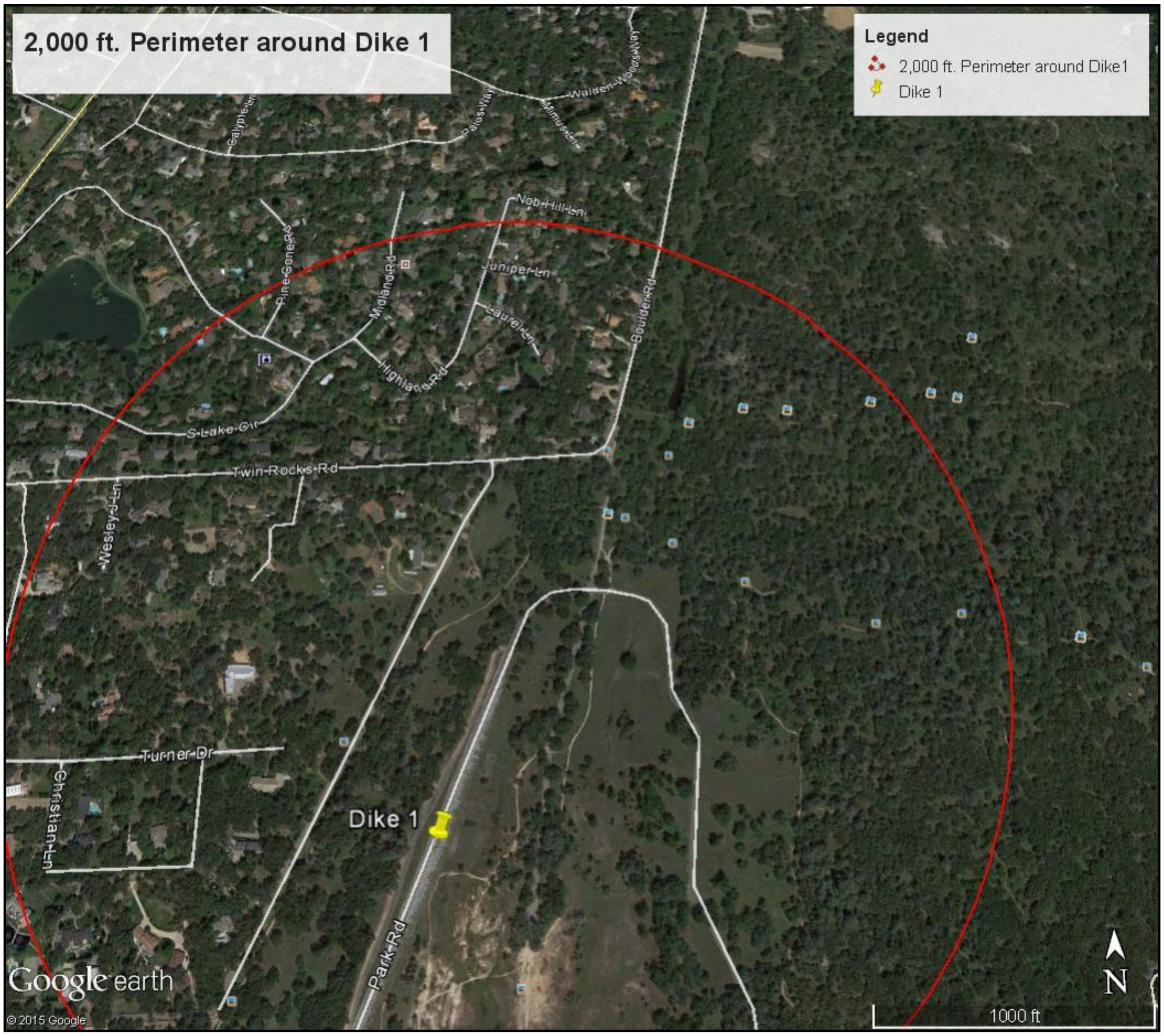

Figure 24. 2,000 Foot Buffer around Dike 1.

Dike 2. The Granite Bay Activity Center is within approximately 600 feet of Dike 2. Numerous residences along Haley Drive are within 1,000 feet of Dike 2. Parts of the beach and the parking lot for the boat launch are within 2,000 feet of the dike as well (Figure 25).

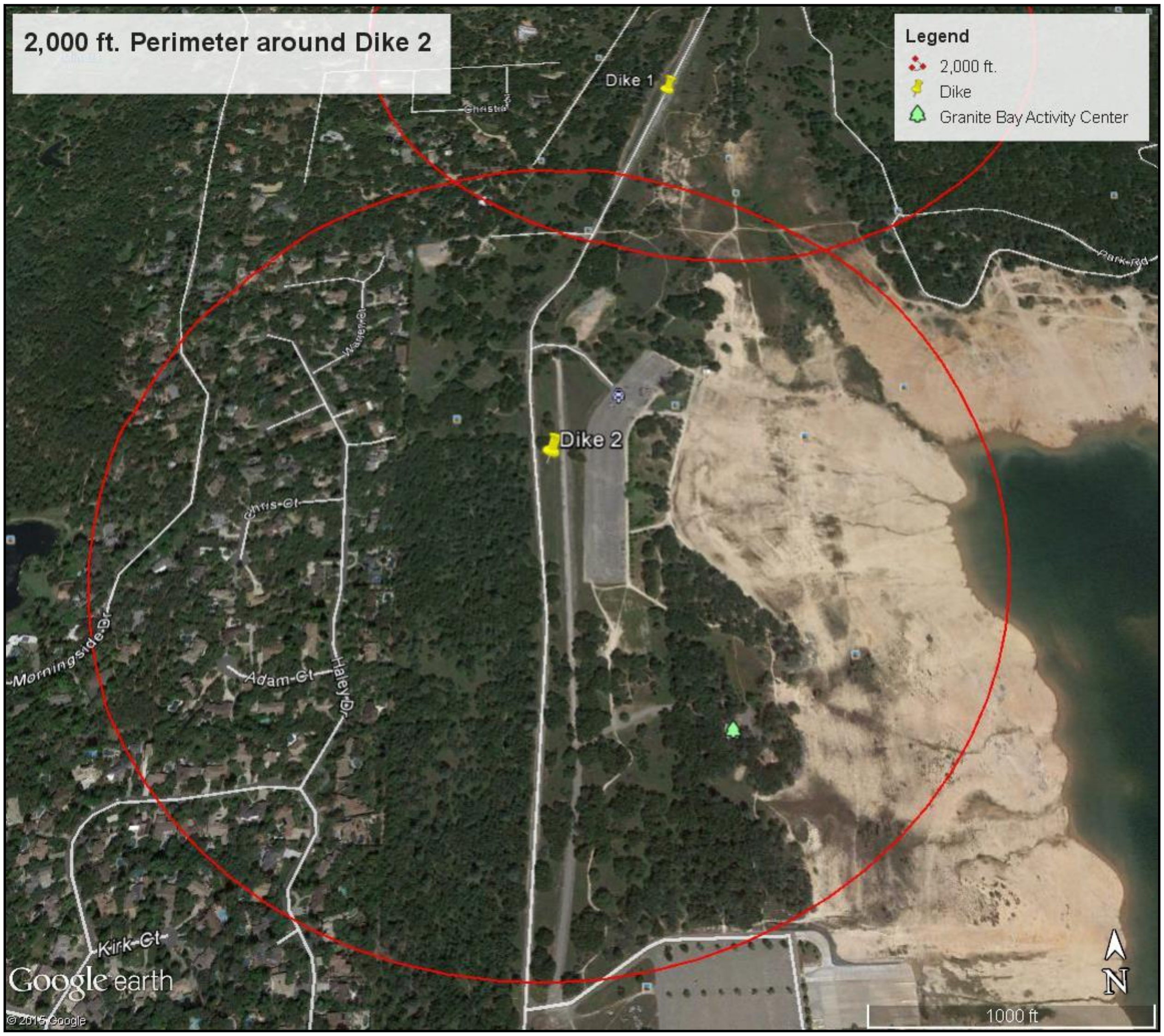

Figure 25. 2,000 Foot Noise Buffer around Dike 2.

Dike 3. The Granite Bay Activity Center is approximately 600 feet of the dike. Residences along East Hidden Lakes Drive and Haley Drive are within 1,000 feet of Dike 3. Residents on Kirk Court, Michael Court, and Jon Way are less than 2,000 feet from Dike 2. Parts of the boat launch and beach area are within 2,000 feet of Dike 3 (Figure 26).

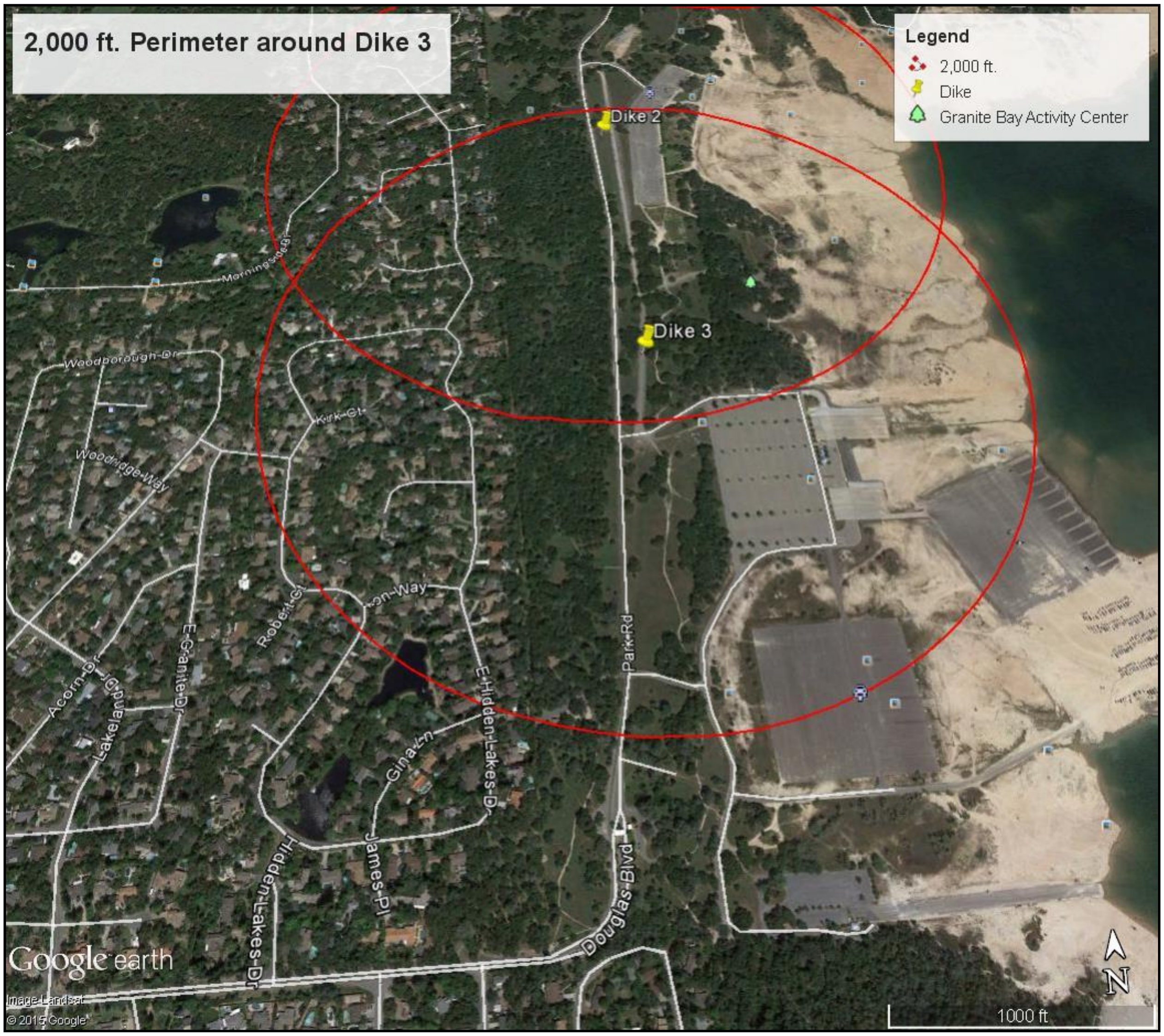

Figure 26. 2,000 Foot Noise Buffer around Dike 3.

Dike 4. Residences to the north of Dike 4 near the intersection of Lake Court and Sierra Drive are within 300 feet of Dike 4. Some residences on Lakeshore Drive are within 700 feet of Dike 4. Residences near the intersection of Bronson Drive and Hill Road are within 800 feet of Dike 4. Sections of multi-use trails are within 300 feet of the dike (Figure 27).

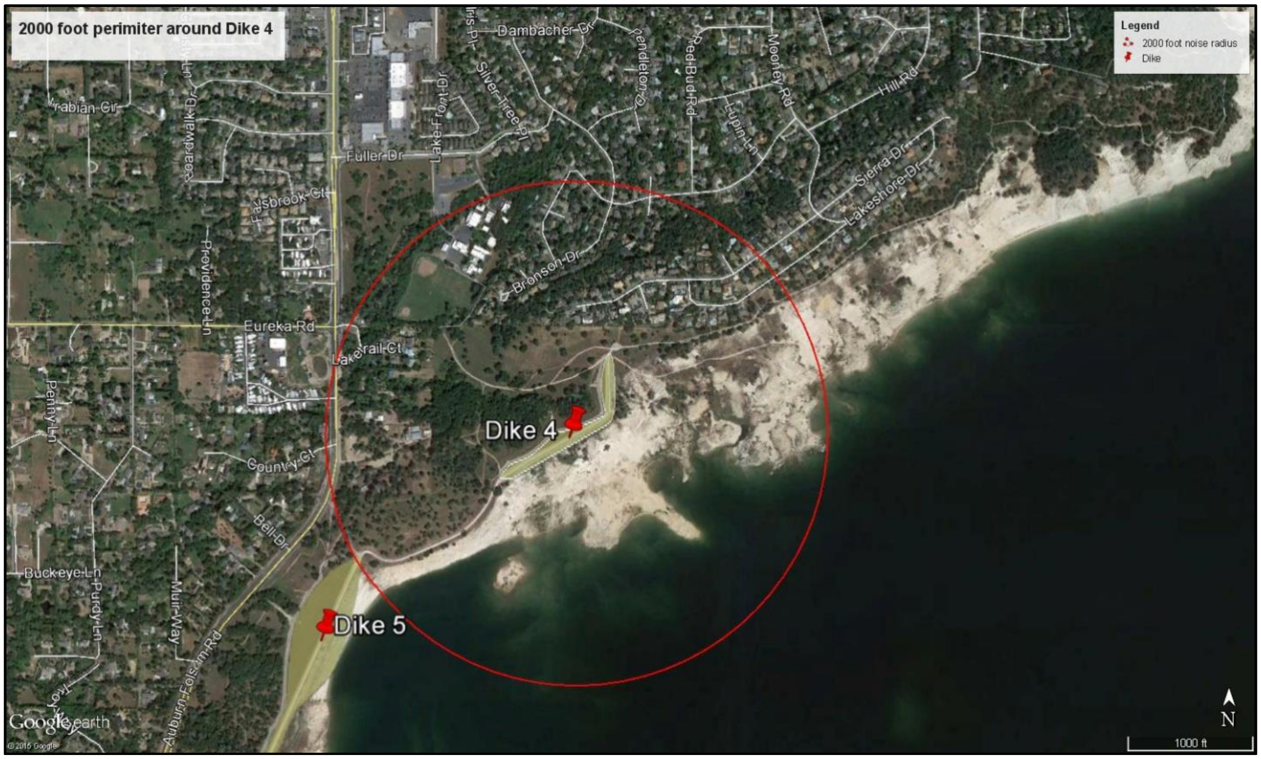

Figure 27. 2,000 Foot Noise Buffer around Dike 4.

Dike 5. There are a number of residences to the west of Auburn-Folsom Road on the southwestern perimeter of the reservoir near Granite Bay, located within 600 to 1,200 feet of Dike 5. Multi-use trails are located within 200 feet of the dike. Various sections of beach are located 200 to 500 feet from Dike 5 (Figure 28).

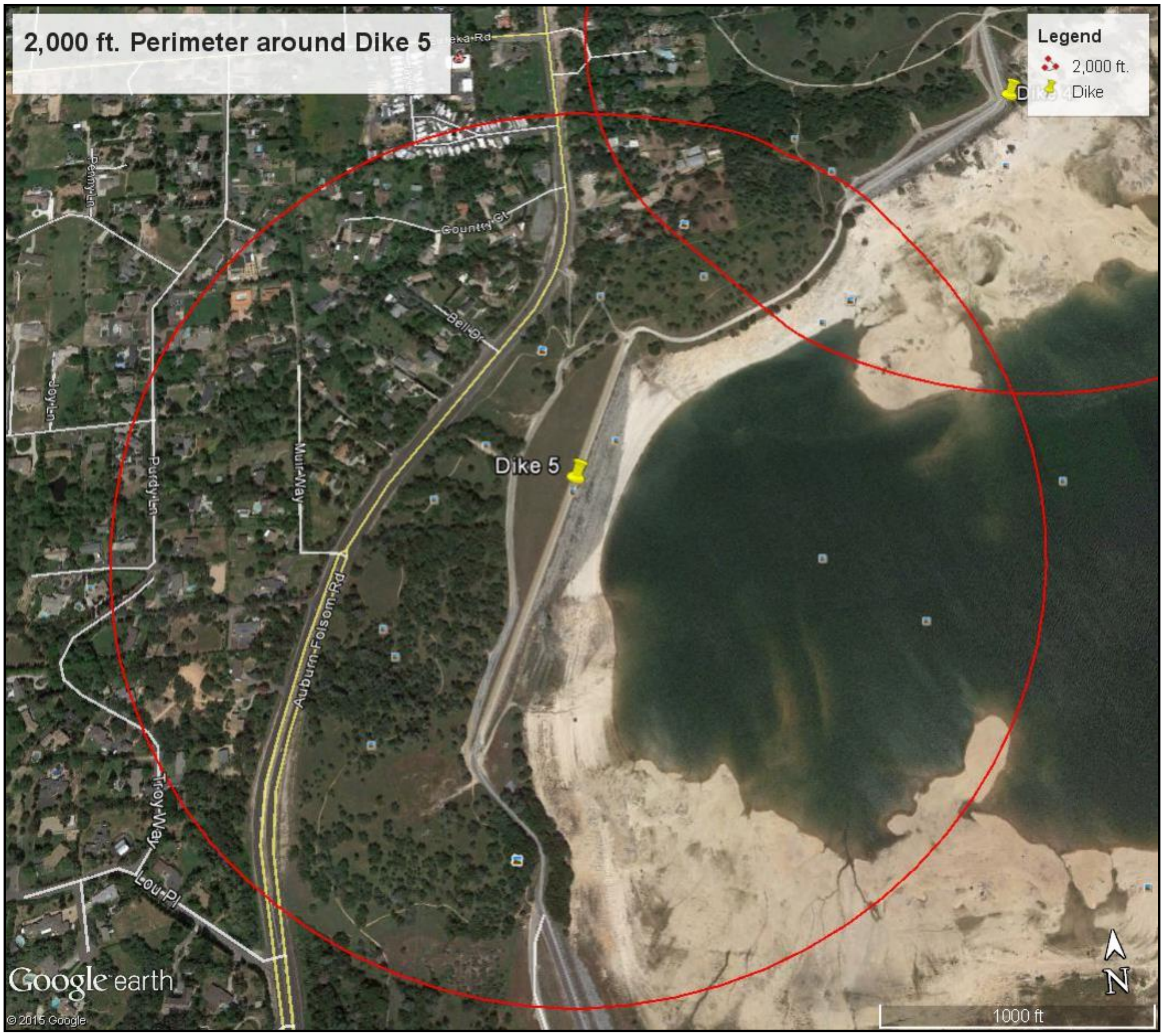

Figure 28. 2,000 Foot Noise Buffer around Dike 5.

Dike 6. Campsites are located within 300 feet of Dike 6 (Figure 28), and multiuse trails are within 500 feet.

Figure 29. 2,000 Foot Noise Buffer around Dike 6.

Right Wing Dam and Left Wing Dam. The access to Beal's Point parking lot is less than 100 feet north of the RWD. Portions of the American River Bike Trail run nearly parallel to the RWD. There are a few residences within 1,000 feet of the RWD, but none within the same distance of the LWD (Figures 29 and 30).

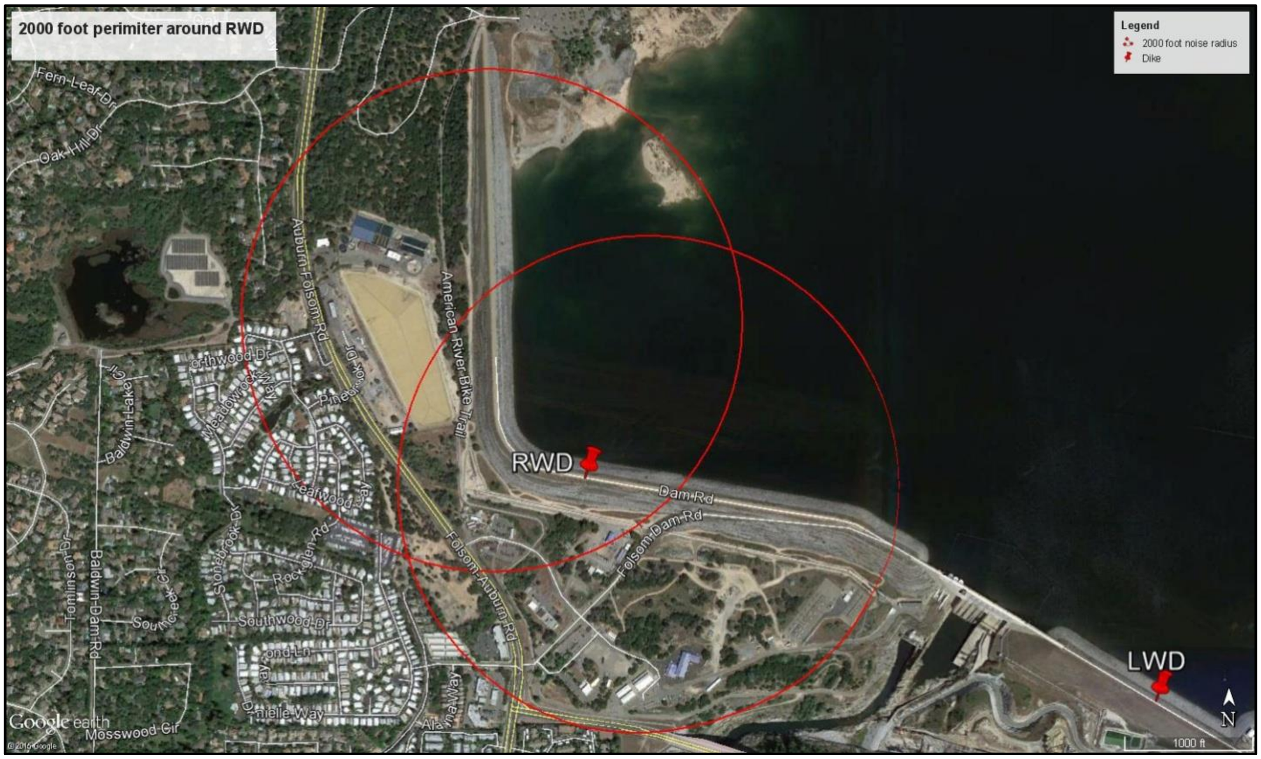

Figure 30. 2,000 Foot Noise Buffer around the Right Wing Dam.
*Two buffers were used in assessment due to size of the Right Wing Dam.

Figure 31. 2,000 Foot Noise Buffer around the Left Wing Dam.

Dike 7, Dike 8, and MIAD. On the southeastern perimeter of the reservoir, some residences are located within 400 feet of Dikes 7 and 8 (Figure 32). The closest residences to MIAD are located approximately 1,200 feet away off Green Valley Road (Figure 33). Construction in these areas could cause a substantial, temporary increase in the ambient noise level and expose sensitive receptors to noise levels that exceed standards established by local noise ordinances.

Figure 32. 2,000 Foot Noise Buffer around Dikes 7 and 8.

Figure 33. 2,000 Foot Noise Buffer around the Mormon Island Auxiliary Dam (MIAD).
*Two buffers were used in assessment due to size of the Mormon Island Auxiliary Dam.

Residences in other areas around the perimeter of Folsom Lake are located far enough away from construction areas to attenuate construction-related noise to an acceptable level. It is not anticipated that construction-related noise would create a significant adverse effect on recreation facilities located at Granite Bay and Beal's Point.

Vibration associated with construction activities would be short-term and due to the distance of structures and sensitive receptors, and would not be significant. Other sensitive receptors that could be affected by this increase include residents, wildlife, and recreationists. Sensitive receptors would experience noise from construction vehicle motors and construction activities. Because the increase in vibration would be short-term and intermittent, the impact would be less than significant.

Temporary noise effects associated with the construction of this alternative are considered significant because of the close proximity of portions of the dikes to some residential areas. Implementation of mitigation measures listed below would reduce this effect, but not to a less than significant level.

3.10.5 Avoidance, Minimization, and Mitigation Measures

The following measures would be implemented to reduce the effects of the noise to less than significant:

- Construction noise would be limited in accordance with the City of Folsom, Sacramento County, and Placer County Noise Ordinance exemption for construction.

- Construction equipment noise would be minimized during project construction by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications), and by shrouding or shielding impact tools.

- All equipment, haul trucks, and worker vehicles would be turned off when not in use for more than 30 minutes.

- Equipment warm up areas, water tanks, and equipment storage areas should be located as far from existing residences as is feasible.

- Provide written notice of construction activities within 2,000 feet of residences or other sensitive receptors. Written notice provided to potentially-affected residences should identify the type, duration, and frequency of construction activities. Notification materials would also identify a mechanism to register complaints if construction noise levels are overly intrusive or if construction occurs outside specified hours.

- Residences and businesses would be notified about the type and schedule of construction at least two weeks prior to mobilization.

- The contractor would measure surface velocity waves caused by equipment and monitor vibration up to a threshold value established and approved in writing by USACE. There would be no vibration exceeding 0.2 inch per second.

Public meetings would be scheduled with affected residents to ensure they are informed of the project schedule and its potential effects. Due to the temporary nature of the construction and the proposed avoidance, minimization, and mitigation measures, impacts would be less than significant.

3.11 Water Quality

Water quality analysis covers the conventional pollutants. For this analysis, conventional pollutants analyzed are:

- pH
- Turbidity
- Total dissolved solids (TDS)
- Dissolved oxygen
- Nutrients, including total organic carbon (TOC), nitrogen, and phosphorus
- Trace elements, including arsenic, cadmium, chromium, copper, lead, nickel, and zinc

Groundwater quality was not analyzed for this report because of the lack of hydraulic connectivity between the dikes, emergency spillway, and the Folsom Reservoir. Previous studies (*e.g.* Sherer 2006) indicate that the data collected throughout the downstream foundation areas indicate that there is no connection between the reservoir and local groundwater levels.

The area of analysis for this section is the aquatic body of Folsom Lake, particularly surface waters within the area of the lake along the dikes, the main dam, and the emergency spillway.

3.11.1 Environmental Setting

Regulatory Setting

The following Federal, state, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations are discussed in Chapter 5.0.

<u>Federal</u>

- Clean Water Act (CWA) (33 USC §1251 *et seq.*)
- National Pollutant Discharge Elimination System (33 USC §1342)

<u>State</u>

- California Water Code
- Local Water Quality Regulations
- Porter-Cologne Water Quality Control Act

Existing Conditions

Pursuant to the Porter-Cologne Act, the Central Valley Regional Water Quality Control Board (RWQCB) prepares and updates the Water Quality Control Plan for the Sacramento and San Joaquin River Basins every three years. The most recent update was completed in October 2011. The plan describes the officially designated beneficial uses for specific surface water and groundwater resources, and the enforceable water quality objectives necessary to protect those beneficial uses. The Folsom Dam Raise project is located within the Central Valley's RWQCB's jurisdiction and is subject to the Basin Plan.

Snowmelt and precipitation from the upper American River Watershed discharges water into Folsom Lake. In general, runoff from the relatively undeveloped watershed is of high quality and rarely exceeds the State of California's water quality objectives (Reclamation Dam Safety SEIS, 2008). The following beneficial uses have been defined by the Central Valley Regional Water Quality Control Board (CVRWQCB) for Folsom Lake: municipal and domestic water supply; irrigation; industrial power; water contact and non-contact recreation; warm and cold freshwater habitat; warm freshwater spawning habitat; and wildlife habitat, along with potential beneficial uses for industrial service supply. Water quality within Folsom Lake and Lake Natoma is generally acceptable to meet the beneficial uses currently designated for these water bodies.

Although groundwater is not a major resource in the vicinity of Folsom Lake, small amounts of groundwater are typically found in granitic fissures and cracks. Because fractured aquifer systems are typically low yielding, surface water sources are primarily used for drinking water or irrigation water sources rather than wells.

The CVRWQCB standards are listed in Table 28. The water quality values measured within Folsom Reservoir from 1992 to 1998 are presented in Table 29. All the data was collected over a six-year period from 1992 to 1998; 104 samples were taken for both pH and turbidity; 47 samples were taken for TOC; 101 samples were taken for electric conductivity (Larry Walker Associates, 1999).

Table 28. Central Valley Regional Water Quality Control Board Water Quality Standards.

Water Quality Parameter	**Objective**
Bacteria	100 MPN/100 ml
Total Dissolved Solids	100 mg/l
Dissolved Oxygen	7.0 mg/l for cold water habitat
	5.0 mg/l for warm water habitat
Turbidity	10 NTU
pH	6.5 to 8.5

Note: MPN is the Most Probably Number

Table 29. Water Quality Parameters Sampled at Folsom Reservoir – 1992 to 1998.

Water Quality Parameter	Minimum	Maximum	Average
pH (standard units)	5.82	8.46	7.09
Turbidity (mg/L)	1	68	1.2
DO (mg/L)	6.1	13.6	10.3
TOC (mg/L)	2	3.5	N/A
Nitrogen (mg/L)	N/A	N/A	N/A
Phosphorus (mg/L)	N/A	N/A	N/A
Electric Conductivity (µS/cm)	18.5	123	52.2

Table 30 presents water quality values within Folsom Reservoir from 2001 to 2005. The nitrogen, phosphorus, and TDS data were collected over a 13-month period from February 2001 to February 2002; five (5) samples were taken for each of these parameters. The TOC data were collected on June 11, 2003; six (6) samples were taken. The pH, electric conductivity, DO, and turbidity data were collected on June 28, 2005; a total of 47 samples were taken (Reclamation 2005, MWH 2003, Wallace, Roberts and Todd et. al. 2003).

Table 30. Water Quality Parameters Sampled at Folsom Reservoir – 2001 to 2005.

Water Quality Parameter	Minimum	Maximum	Average
pH (standard units)	6.6	8.23	6.94
Turbidity (NTU)	1	126.9	8.4
DO (mg/L)	4.95	7.93	6.88
TOC (mg/L)	1.5	1.8	1.6
Nitrogen (mg/L)	<0.050	0.11	0.062
Total Phosphorus (mg/L)	<0.010	<0.050	0.0212
TDS (mg/L)	39	44	41.8
Electric Conductivity (µS/cm)	32.5	61.6	46.2

Fecal coliform bacteria levels within Folsom Reservoir are presented in Table 31. The values for Granite Bay and Beal's Point represent data collected over a five-month period (May 2003 to September 2003); 19 samples were taken at each location. The values for Folsom Dam represent data collected over a 13-month period from February 2001 to February 2002; 5 samples were taken (Reclamation 2003; Wallace, et al. 2003).

Table 31. Folsom Reservoir Coliform Sampling – 2001 to 2003, Fecal Coliform Concentrations (MPN/100mL).

Site	Minimum	Maximum	Geometric Mean
Granite Bay	2	300	9
Beal's Point	2	900	18
Folsom Dam	2	30	12.2

3.11.2 Environmental Consequences

Methodology

Effects on water quality that could result from construction activities were qualitatively evaluated based on the construction practices and materials to be used, the location and duration of the activities, and the potential for water-quality or beneficial-use degradation of project waterways (Table 32). Standard pollution prevention measures, including erosion and sediment control measures, good housekeeping, proper control of non-stormwater discharges, and hazardous spill prevention and response measures, would be implemented as part of the project design.

Table 32. Summary of Potentially Significant Water Quality Effects.

Threshold	Rational for Evaluating Potential Effects
Fecal Coliform Bacteria	Effects not likely since potential bacteria sources are not associated with the project
pH	Any release of concrete wash water without treatment or approved BMPs
DO	Discharges with chemical or biochemical oxygen demand, low DO
Oil and Grease	No visible sheen or adverse effects due to the use of heavy equipment
Turbidity	Discharges with high turbidity
Nutrients	Discharges with high turbidity

Basis of Significance

For this analysis, an effect pertaining to surface and ground water quality was considered significant under CEQA and NEPA if it would result in any of the following environmental effects, which are based on professional practice, Federal guidelines, and State CEQA Guidelines Appendix G (14 CCR 1500 *et seq*.):

- Violate water quality standards or waste discharge requirements;
- Substantially degrade water quality; and
- Alter regional or local flows resulting in substantial increases in erosion or sedimentation.

3.11.3 Alternative 1: No Action Alternative

Under this alternative, water resources or quality would not be affected by construction in the project area. The surface and groundwater conditions would continue to be affected by contaminants through runoff. Extreme flooding events could wash siltation and contaminants into the water system, and if emergency work became necessary to prevent dike failure, measures required for the protection of water quality might not be used.

3.11.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

An assessment was conducted by USBR on the Folsom Dam temperature shutters (2001). It was concluded that lead paint should be assumed present in all underlying primer on the structure. Some of the work on the tainter gates would be done over water and there is the potential for lead paint to enter surface water downstream of the dam. Stop logs would be installed on the waterside of the tainter gates to hold back the water. This, along with the implementation of best management practices and the mitigation measures listed below, assumes that direct effects to water quality for the rehabilitation of the spillway would be less than significant.

This action would neither increase the occurrence of impervious surfaces such as parking lots or buildings, nor change the existing land uses such that hydromodification would occur. Existing drainage infrastructure (function and capacity) would not be altered from the 3.5-foot raise of the dikes, wing dams, and MIAD. Overall, the drainage patterns would not be substantially altered; therefore the direct and indirect affect to local drainage would be less than significant. Implementation of the Stormwater Pollution Prevention Plan (SWPPP) would ensure that there is no exceedance of the capacity of stormwater drainage infrastructure, and therefore effects to the infrastructure (dikes, etc.) would be less than significant with mitigation.

Project activities, such as drilling, excavation, hauling, and fill placement may disturb or mobilize sediments, which have the potential to affect total suspended solids, pH, turbidity, and dissolved oxygen.

Installation of the dike raises and the concrete floodwalls, and use of the identified staging areas, could have short-term direct impacts on water quality from ground-disturbing activities. Exposed soil on the dikes could potentially erode as a result of significant runoff events, causing increased turbidity in local waters. In addition, debris and inadvertent spills of fuels, oils, or concrete mix materials from construction equipment, in work areas, or in the staging areas could be a source of contamination into adjacent waterways.

Run-off could result from excavation activities with potentially higher concentrations of total dissolved solids, both direct and indirectly. Should run-off reach the reservoir, there is a potential to create turbidity and introduce associated contaminants to the receiving waters.

The contractor would be required to obtain an NPDES Construction Storm Water Permit from the CVRWQCB because the project would disturb more than one acre of land. Across the entire construction site, debris, soil, or oil and fuel spills could temporarily adversely affect the water quality of Folsom Lake. The construction storm water permit pertains to the prevention of increased turbidity of adjacent waterways as a result of site erosion and sedimentation, as well as debris, soil, fuel, and oil spill prevention. The contractor would be required to design and implement a SWPPP prior to initiating construction activities, and to implement standard BMPs. There is also a potential for fugitive dust and construction runoff to enter waterways due to soil excavation, equipment use, cutoff wall construction, and movement of trucks in the project areas and along the haul routes. However, frequent watering of haul routes, proper coverage and control of material stock piles, and installation of BMPs would help to prevent such pollution impacts.

By obtaining NPDES permits and the implementation of BMPs, water quality standards or waste discharge requirements associated with earth moving activities would be met; therefore impacts would be less than significant.

3.11.5 Avoidance, Minimization, and Mitigation Measures

The contractor would be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the Regional Water Quality Control Board (RWQCB), Central Valley Region. As part of the permit, the contractor would be required to prepare a SWPPP and a SPCP prior to initiating construction activities, identifying BMPs to be used for avoidance or minimization of any adverse effects during construction to surface waters.

Pollution prevention measures should be incorporated into all final design and construction plans. The pollution prevention measures would include erosion and sediment control measures, and measures for non-stormwater discharges (i.e., construction dewatering and appropriate spill prevention and containment measures). Measures would be implemented to avoid accidental spills and sediment dispersal during barging of borrow materials. Construction contractor(s) would be required to obtain coverage under the NPDES General Storm Water Permit for Construction Activities from the State Water Resources Control Board (SWRCB), and obtain any applicable waste discharge requirements. Work under NPDES jurisdiction requires the preparation of a SWPPP. The SWPPP would describe the proposed construction activities and pollution prevention measures that should be implemented to prevent discharge of pollutants. The SWPPP would also include a description of inspection and monitoring activities that shall be conducted. Construction and post-construction monitoring should be conducted to ensure that all pollution prevention efforts are performed as described in the SWPPP. The SWPPP should be amended in the event modifications to the pollution prevention measures become necessary.

The following BMPs would be incorporated into the project:

- Implement appropriate measures, such as straw wattles and silt fencing, to prevent debris, soil, rock, or other material from entering the water.

- Use a water truck or other appropriate measures to control dust on haul roads, construction areas, and stockpiles.

- Properly dispose of oil or other liquids.

- Fuel and maintain vehicles in a specified area that is designed to capture spills. This area cannot be near any ditch, stream, or other body of water or feature that may convey runoff to a nearby body of water.

- Fuels and hazardous materials would not be stored on the site, unless in a specified area that is designated to capture spills.

- Inspect and maintain vehicles and equipment to prevent the dripping of oil or other fluids.

- If rain is forecast during construction, inspect erosion/sedimentation prior to rains and implement additional measures as needed.

- Maintain sediment and erosion control measures during construction. Inspect the control measures before, during, and after a rain event.

- Train construction workers in storm water pollution prevention practices.

- Revegetate disturbed areas in a timely manner to control erosion.

In accordance with 29 CFR 1926.62 Lead and 8 CCR 1532.1 Lead, for all construction jobs where lead is present the following is required:

- Housekeeping. Lead dust on surfaces, especially in eating areas, must be controlled by HEPA vacuuming, wet cleanup, or other effective methods.

- Hand and face washing. Workers must have washing facilities with soap and clean water.

- Training. Workers must receive training on lead hazards and how to protect themselves.

- A written compliance program to assure control of hazardous lead exposures.

- Employers must assess the amounts of lead breathed by workers. This is usually done by employee breathing-zone air sampling. Air sampling results are used to determine if clean areas for eating and clothing change, showers, full worker training, and medical monitoring with routine blood testing for lead and zinc protoporphyrin (ZPP) is necessary, as well as the type of respirator that must be worn for protection.

3.12 Cultural Resources

The following section addresses cultural resources impacts that could result from implementation of one of the proposed alternatives for the Folsom Dam Raise Project. “Cultural resources” describe several different types of properties: prehistoric and historic archeological sites; architectural properties such as buildings, bridges, and infrastructure; and resources of importance to Native Americans (traditional cultural properties and sacred sites). “Artifacts” include any objects manufactured or altered by humans.

Prehistoric archeological sites date to the time before recorded history, and in this area of the U.S., sites are primarily associated with Native American use before the arrival of European explorers and settlers. Archeological sites dating to the time when these initial Native American-European contacts occurred are referred to as protohistoric. Historic archeological sites can be associated with Native Americans, Europeans, or any other ethnic group. In the project area and surrounding area, these sites include the remains of historic structures and buildings.

Structures and buildings are considered historic when they are more than 50 years old, or when they are exceptionally significant. Exceptional significance can be attributed if the properties are integral parts of districts that meet the criteria for eligibility for listing in the National Register of Historic Places (NRHP), or if they meet special criteria considerations.

3.12.1 Environmental Setting

Regulatory Setting

- National Historic Preservation Act of 1966, as amended (NHPA)

- Assembly Bill 52 (AB52)

Existing Conditions

For purposes of complying with Section 106 of the NHPA, a Federal agency would make a determination of the Area of Potential Effects (APE) for the project or undertaking. The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character of use of historic properties, if any such properties exist." Additionally, the APE "is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

The APE may extend beyond the physical impacts associated with a project. Depending on the scale and nature of the undertaking and the known and anticipated types of cultural resources, the direct or indirect effects may include, but are not limited to: physical modification, intrusion to the visual or aesthetic characteristics of landscapes or features, or even access to a historic property.

The APE for the Folsom Dam Raise Project includes all areas of ground disturbance, staging areas, and modifications to manmade structures (Folsom Dam, Dikes 1 through 8, MIAD, LWD, and RWD). The existing conditions, records and literature search, and inventory and evaluation of cultural resources cover the APE for the Folsom Dam Raise Project.

<u>Prehistoric Cultural Context</u>

Since the Folsom Dam Raise Project area lies within two specific cultural areas, both the Lower Sacramento Valley and the Northern Sierra slope regions, the context below summarizes the distinct cultural chronologies for each of these regions.

<u>Lower Sacramento Valley</u>

Prehistorically, the Lower Sacramento Valley has been subjected to archeological interest since the last decade of the nineteenth century, culminating with early avocational archeologists establishing a temporal schedule for this region, referred to as the Central California Taxonomic System (CCTS) (Nilsson and Smith 2006; Moratto 1984). The CCTS is organized into three very broad divisions, the Early, Middle, and Late Horizon. This broad classification has largely fallen out of use, mostly due to obscured gradual changes throughout time, ignored diversity in the archeological record, and ignored smaller spheres of culture within the Central Valley (Waechter and Mikesell 1994). For these reasons, the cultural history discussion would concentrate on the pattern-aspect theme, presented by Frederickson (1973), in an effort to take into account cultural variation between sub-regions as well as material culture and behavior.

Windmiller Pattern (4,500-3,000 B.P.)

This pattern exemplifies the earliest occupation in the Sacramento Valley and encompasses aspects ascribed to the Early Horizon of the CCTS. This pattern is characterized by the exploitation of both game and plant resources and acquisition of utility goods, as well as ornamental and ceremonial objects, many of which were apparently obtained as finished items as opposed to raw materials (Moratto 1984). In regards to settlement practices, the Windmiller pattern suggests that populations may have established winter villages in the valley, with summer exploitation of the foothill zones. Within the archeological record, the Windmiller pattern is characterized by extended burials with westerly orientation as well as the presence of grave goods, which has been utilized to identify social stratification within the Windmiller peoples.

Berkeley Pattern (3,500-1,500 B.P)

The Windmiller Pattern gives way to the Berkeley Pattern in the Sacramento Valley, marking a transitional shift as opposed to a sudden and total replacement of the culture that proceeded. This pattern corresponds with the Middle Horizon of the CCTS and is represented by an increased dependence on acorn milling, evidenced by an increase in mortars and pestles within the archeological record for the Berkeley people. Cultural material includes the occurrence of an extensive bone tool kit, unique flintworking techniques, and certain types of shell beads and pendants within Berkeley pattern sites. Burial practices of Berkeley peoples included interring their dead in flexed positions with variable burial orientation. There has also been evidence of cremation practices within the Berkeley Pattern as well as a decrease in the numbers and variation of grave goods.

Augustine Pattern (1,500 B.P. to Contact Period)

The Augustine Pattern, assigned to the Late Horizon, is distinguished by intensive fishing, hunting and gathering, and reflects local innovation in technology and the integration of new developments with traits from the previous Berkeley Pattern. Settlement patterns exhibit highly stratified populations, indicated by the increased variation in mortuary practices and types of grave furnishings (Bennyhoff and Fredrickson 1994). Exhibited within the archeological collection is evidence for extensive trade networks, connecting the interior to the coast (Nilsson and Smith 2006). Archeologically, the Augustine Pattern is characterized by baked clay items, the introduction of the bow and arrow which replaced the dart and atlatl as the favored hunting implement, and the presence of side-notched, serrated arrow points. In the archeological record, evidence of the Augustine Pattern is also displayed in the distinctive *Olivella* shell bead types, clamshell disc beads, stone tubular pipes, and flat bottomed mortars.

Northern Sierra

Many researchers working within the project area have chosen to refer to the Central Valley sequence, specifically as it relates to work performed adjacent to Folsom Reservoir, when discussing chronologies. In 1952, archeological investigations were performed by the University of California at Berkeley, and it was through this research that Heizer and Elsasser (1953) developed two archeological cultures separated in time and space; the Martis Complex and the Kings Beach Complex.

Martis Complex (4,000-1,500 B.P.)

The Martis Complex, centered in the Martis Valley, represents the earliest occupation of the north-central Sierran foothills and mountains. The dates of the complex is determined by both obsidian hydration measurements and radiocarbon dates (Elsasser and Gortner 1991). The Martis Complex is characterized by an artifact assemblage dominated by local lithic materials consisting of basalt as opposed to obsidian tool production. Other cultural material indicative of this complex includes large, roughly shaped projectile point, and “boatstones” or atlatl weights (use of atlatl and dart). Plant processing tools such as the mano and millingstones for seed milling, bowl mortar and cylindrical pestle, are displayed in the artifact assemblages. Based upon the large numbers of projectile points and milling equipment discovered in the archeological record, there was an apparent economic emphasis on hunting and seeding (Moratto 1984). Elsasser and Gortner also note the frequent association of Martis assemblages with petroglyphs of the “Central Sierra Abstract Style” and suggest that these locations may represent high-elevation summer hunting camps (Waechter and Mikesell 1994).

Kings Beach Complex (1,500 B.P. to Contact Period)

The Kings Beach Complex, named after a site on the north shore of Lake Tahoe, was distinguished by flaked obsidian and chert tool stones over basalt resources. The archeological assemblages of Kings Beach are characterized by sparse artifact scatters overlying deeper Martis settlements (Elston et al 1977). The Complex employed the use of small projectile points, hunting technology based upon the bow and arrow, bedrock mortars, and cobble pestles. Although hunting played a role in Kings Beach subsistence patterns, fishing and gathering strategies are thought to have constituted the main focus of site use. This is indicated by the site locations situated at the mouths and confluence of streams within the Lake Tahoe region. Researchers have ascribed this complex to the ethnographic Washoe after 1,000 B.P. (Heizer and Elsasser 1953). The results of the work originally performed by Heizer and Elsasser dated the Kings Beach Complex to no earlier than 1000 years B.P, leaving a substantial chronological gap between the two complexes. Due to the work by W. Davis and R. Elston in the Lake Tahoe region, their efforts proved successful in finding evidence for a transitional phase between both the Martis and Kings Beach Complexes (Elston 1977).

Ethnographic Background

Ethnographic Overview

The Folsom Dam Raise Project APE is located within the territorial boundaries of the ethnographic Nisenan. The Nisenan, often referred to as the Southern Maidu in anthropological literature, are classified as the southern linguistic group of the Maidu tribe, and together with Maidu and Konkow, form a subgroup of the California Penutian linguistic family (Wilson and Towne 1978). The Nisenan linguistic group is further subdivided based on dialect into Northern Hill Nisenan, inhabiting the Yuba River drainage; Southern Hill Nisenan, living along the American River; and Valley Nisenan, occupying a portion of the Sacramento River Valley between the American and Feather Rivers (Beal's 1933; Kroeber 1925, 1929).

Prior to Euroamerican contact, Nisenan territory extended west into the Sacramento Valley to encompass the lower Feather River drainage, north to include the Yuba River watershed, south comprising the whole of the Bear and American River drainages and the upper reaches of the Cosumnes River, and east to the crest of the Sierra Nevada (Wilson and Towne 1978).

The information in this section is derived from a variety of sources, including: Bennyhoff (1977); Beal's (1933); Gifford (1927); Kroeber (1925, 1929); Littlejohn (1928); and, Wilson and Towne (1978). Additional resources on Nisenan and Miwok ethnography include: Faye (1923); Levy (1978); Powers (1976); and, Schulz and Ritter (1972). The following is a brief synthesis focusing on selected traits of Valley Nisenan ethnography that may manifest archaeologically.

Habitation Patterns

The Nisenan were organized by tribelet, each tribelet being composed of several large, semi-autonomous villages that accepted the leadership of the headman of a specific village. Headmen acted as advisors for major decision making, communal hunts, and ceremonies. Wilson and Towne (1978) identify three Valley Nisenan tribelet centers in the Sacramento Valley: at the mouth of the American River (present-day Sacramento); at the mouth of the Bear River; and, at the confluence of the Yuba and Feather rivers near present-day Marysville.

Nisenan villages varied greatly in size, ranging from three to seven houses up to 40 to 50 houses, with the largest valley villages inhabited by more than 500 people (Littlejohn 1928). Villages in the lower valleys tended to be located along low rises and mounds adjacent to streams and rivers.

Nisenan built structures, including semi-permanent houses, which were generally conical, measuring 10 to 15 feet in diameter and covered with tule mats, grasses, or earth. Smaller, temporary wikiup-like shelters, made of upright poles and cloaked in brush, were used in the warm seasons while hunting and gathering (Curtis 1924; Kroeber 1925). Other structures commonly associated with village sites include semi-subterranean dance houses, acorn granaries, and sweathouses (Wilson and Towne 1978). Each Nisenan tribelet controlled the natural resources within a bounded tract of land (Littlejohn 1928). These boundaries were often indicated by piles of stones (Littlejohn 1928). Beal's (1933) estimated that Nisenan tribelet territory averaged approximately 100 square miles.

Subsistence

The basic subsistence strategy of the Nisenan was seasonally mobile hunting and gathering. Acorns from the California Black Oak, the primary staple, were gathered in the fall and stored in granaries for use during the rest of the year. Other plant resources included seeds, buckeye, wild onion, wild sweet potato, Indian potato, wild garlic, wild carrot, many varieties of berries and fruit, grasses, herbs, and rushes. During the warmer months, people moved to mountainous areas to hunt and collect food resources particular to higher elevations.

Communal hunting drives were undertaken to obtain deer, quail, rabbits, and grasshoppers. Game was prepared by roasting, baking, or drying. Mountain lions and bobcats were hunted for their skins as well as their meat, and bears were hunted ceremonially in the winter when their hides were at their best condition (Wilson and Towne 1978). Runs of salmon in the spring and fall provided a regular supply of fish, while other fish, such as suckers, pike, whitefish, and trout were caught with hooks, harpoons, nets, weirs, snares, fish traps, or by using fish poisons such as soaproot. Birds were trapped with nooses or large nets, or shot with bow and arrow (Wilson and Towne 1978).

Many wild plants may also have been "managed" by prescribed burning that removed underbrush and encouraged growth of edible grasses, seed-producing plants, and other useful plant resources such as basketry materials (Blackburn and Anderson 1993). The use of fire for environmental modification and as an aid in hunting is frequently mentioned in ethnographic literature relating to the Nisenan. Littlejohn (1928) noted that the lower foothills in the valley oak zone were thickly covered with vegetation that was annually burned by the Nisenan to remove and limit its growth while encouraging the growth of oaks and the harvest of acorns. The annual fires destroyed seedlings but did not harm established oak trees. Beal's (1933) also noted that the Nisenan regularly burned the land, primarily for the purpose of driving game.

Technology and Trade

Stone technology included flaked stone knives, projectile points, and other tools made from obsidian, basalt, and silicates. Ground stone tools included club heads, pipes, charms, and mortars and pestles made from local coarser-grained rocks (Beal's 1933; Wilson and Towne 1978). Shells and beads manufactured from bone, shell, and minerals, such as magnesite, were used for ornamentation. Wood and bone were used for a variety of tools and weapons, including bows, arrow shafts and points, fishhooks, looped stirring sticks, flat-bladed mush paddles, pipes, and hide preparation tools. Cordage was made from plant material and was used to construct fishing nets as well as braided and twined tumplines.

Baskets were used for a variety of tasks, including storing, cooking, serving, and processing foods. Basketry items consisted of burden baskets, traps, cradles, hats, cages, seed beaters, and winnowing trays. Basket manufacturing techniques included both twining and coiling, and baskets were decorated with a variety of designs and materials. Other woven artifacts included tule matting and netting made of milkweed, sage fibers, or wild hemp. In the Sacramento Valley, the Nisenan used tule balsa rafts and log canoes (Kroeber 1929) for fishing, and used the boats extensively for travel among the major river villages.

Trade and exchange networks were established with neighboring groups for food and other items, both practical and ornamental, which were not available within Nisenan territory. Clamshell disk beads, used as a mode of currency, were acquired from Patwin and other outside sources. Obsidian was highly valued and imported. Nisenan informants stated that obsidian only came from a place to the north, outside of Nisenan territory (Littlejohn 1928). Abundant archaeological evidence suggests that the vast majority of obsidian in southern Nisenan territory is derived from either Bodie Hills to the east, or Napa Valley to the west. Nisenan commodities traded to neighboring groups included salmon, deer, and acorns (Davis 1961).

Intergroup Relations

Nisenan and Miwok peoples frequently interacted as trading partners, at ceremonial gatherings, and in armed conflict primarily due to perceived territorial encroachment. The ethnographic literature, particularly in reference to the Nisenan, reports rather regular hostilities between Hill and Valley Nisenan, and Nisenan and Sierra Miwok (cf., Littlejohn 1928; Beal's 1933). Most interactions between the two ethnographic groups, however, appear to have been civil, friendly in nature, and characterized by considerable intermarriage.

<u>Ethnohistory</u>

Initial contact with Euroamericans in the eighteenth century had little effect on the Nisenan. The earliest contacts were Spanish exploratory expeditions in the Central Valley led by José Canizares and Gabriel Moraga, followed in the 1820s by American and Hudson's Bay Company trappers. Introduced diseases, against which they had no natural immunities, were the single greatest cause of death among California Native Americans after Euroamerican contact.

The great epidemic of 1833 (probably malaria) devastated the Valley Nisenan population by as much as 75 percent, in some instances wiping out entire villages.

Captain John Sutter settled in Nisenan territory in 1839. Word of James Marshall's 1848 discovery of gold near the Nisenan settlement of Culloma (Coloma) soon triggered an influx of thousands of fortune seekers in Hill Nisenan territory (Wilson and Towne 1978). From the 1870s until the 1890s, the Nisenan experienced a cultural and religious resurgence with the Ghost Dance revival of 1870. Originating with the Paiute, the basic tenets included the end of the world and/or return of the dead, return of the world to Native Americans, and the destruction of White People (Bean and Vane 1978:670). Native American "rancherias" were established by the federal government in the Maidu area between 1906 and 1937. Today, the majority of the estimated 2,500 Maiduan peoples (including persons descended from Nisenan, Konkow, and Maidu groups) live within the traditional territory inhabited at historic contact by their ancestors.

Historic Context

The following Historic Context section is taken from the "Cultural Resources Literature Search, Inventory, and National Register Evaluations for the Folsom Dam Safety and Flood Damage Reduction EIS/EIR, El Dorado, Placer, and Sacramento Counties, California" report completed by Pacific Legacy, Inc. (Bartoy 2007).

Exploration into the interior of present day California began in 1808 with an expedition led by the Spanish explorer Gabriel Moraga, looking for potential sites for new missions (Thompson and West 1880). The British, working for the Hudson's Bay Company based out of Fort Vancouver on the Columbia River, entered the region from the north via the Siskiyou Trail in the late 1800s (Dillon 1975). The Americans, led by Jedidiah Strong Smith in 1826, followed an overland route (Hurtado 1888:39-42). Smith led a small band of men across the Sacramento Valley in 1827, searching for a pass across the Sierra Nevada and camping at a site that is now part of the City of Folsom.

Fur Trappers were followed by military expeditions in the 1840s, charged with exploring the region in advance of American westward expansion. A detachment of the Wilkes expedition, led by Lt. George Foster Emmons, traveled from the Columbia River to Sacramento in 1841. John Charles Frémont led the Army Corps of Topographical Engineers into present day California in two separate expeditions in the 1840s.

The area surrounding Folsom Lake was first settled by Euro Americans following the discovery of gold at Coloma in 1848. This discovery led to an influx of miners who sought rich placer deposits along the American River and its tributaries. As new deposits were discovered, towns and camps were established near the discoveries and these quickly developed into communities to provide for needs of the expanding population. These communities included Mormon Island, Goose Flat, Alabama Bar, Sailor's Bar, Negro Hill, Salmon Falls, McDowell Hill, Beal's Bar, Condemned Bar, Doton's Bar, Long Bar, Horseshoe Bar, and Rattlesnake Bar (Hoover et al. 1966:300; Peak and Associates 1990:5; Waechter and Mikesell 1994:11-12).

Mormon Island, site of California's second important gold discovery, was one of the most prominent of these early communities. The camp was originally established on a gravel bar at the confluence of the North and South Forks of the American River. The settlement was located on a branch of the Coloma Road, the first route into the region which connected Sutter's Fort in Sacramento to his sawmill in Coloma. "By 1853, the camp had some 2,500 inhabitants and had three dry goods stores, five general merchandise stores, two blacksmith's shops, a bakery, saloons, hotels, schools, a post office, and express offices for both Wells Fargo & Company and Adams & Company" (Waechter and Mikesell 1994:12). As with the majority of the communities formed by miners, Mormon Island went into decline as nearby gold deposits were exhausted. By the 1880s, the population had dwindled to 20 and no residents were present when the town site was inundated by the Folsom Reservoir (Waechter and Mikesell 1994).

As hard rock and hydraulic mining replaced placer mining in the 1850s, the need for large amounts of water led to the construction of numerous dams, ditches, and flumes throughout the region. The largest and most prominent of these endeavors were undertaken by two joint stock companies: the Natomas Water and Mining Company, and the American River Ditch Company. Although several smaller companies were involved in the creation of water conveyance systems in the region, such as the Salmon Falls Water and Mining Company who constructed the Clark-Eastman Ditch, and the Negro Hill Ditch Company who constructed the Negro Hill Ditch, these operations were overshadowed by the large scale projects of the Natoma Water and Mining Company and the later American River Ditch Company.

First founded by A.P. Catlin in 1851 and later acquired by H.G. Livermore in 1862, the Natomas Water and Mining Company completed its first water conveyance from near Salmon Falls on the South Fork of the American River, to Granite City (Folsom) in 1854. That same year, several shareholders organized the American River Ditch Company to complete a similar project along the North Fork of the American River. Following the company's acquisition by Livermore in 1862, the company became increasingly interested in water development for industry as well as for logging. The Natomas Water and Mining Company spawned two additional entities under Livermore, the Folsom Water and Power Company, which promoted water-powered industry, and the American River Land and Lumber Company, which controlled the timber-related activities (Waechter and Mikesell 1994:10). As part of this move to water power and logging, the original Folsom Dam was completed in 1893.

Although mining continued in importance through the second half of the nineteenth century, the depletion of gold deposits led to an increased investment in other activities, most significantly agriculture. Initially developed for mining, the series of ditches and flumes throughout the area around Folsom Lake provided the necessary water to provide for the agricultural productivity of the region. In response to the switch from mining to agriculture, the Natoma Water and Mining Company as well as the American River Ditch Company organized several new companies, including the Natomas Vineyards Company and the North Fork Ditch Company. In the twentieth century, through a series of reorganizations and sales, the Natomas Water and Mining Company became simply the Natomas Company while the American River Ditch Company became the San Juan Suburban Water District (Waechter and Mikesell 1994).

As the twentieth century progressed, agriculture replaced mining as the dominant industry in the region. The ample supply of water and the rich soils of the area provided for the cultivation of grain, hay, wine grapes, oranges, and other fruits (Peak and Associates 1990:9). Although a small community existed at Salmon Falls, none of the numerous mining communities still existed in the area. By the early 1950s when the federal government acquired the land to create the present Folsom Reservoir, few people inhabited the region.

Folsom Dam was completed in 1956 and consists of a concrete dam flanked by earth wing dams and dikes, with a total length of approximately nine miles. The reservoir created by the dam has approximately 10,000 surface acres of water when full, and approximately 75 miles of shoreline. The reservoir extends approximately 15 miles up the North Fork and 11 miles up the South Fork of the American River. The Folsom Dam is part of the Central Valley Project, which includes a vast network of dams, reservoirs, canals, power plants, and pumping plants throughout California's Central Valley.

Records and Literature Search

An extensive records search of the APE was conducted at the California Historical Resources Information System, North Central Information Center, California State University, Sacramento, in December 2011. The Corps examined previously completed archeological survey and excavation reports, existing site records, and local and regional overviews within and adjacent to the Folsom Reservoir. All or portions of the APE have been surveyed in previous investigations, all consisting of various levels of intensity. In 2007, Pacific Legacy, Inc. (Bartoy et al) performed a cultural resource literature search, inventory, and NRHP evaluation in relation to proposed safety and flood control measures undertaken at Folsom Dam that covered much of the APE. The study area for the 2007 cultural resource inventory consisted of the footprints of Dike 1 through Dike 8, RWD, the area below LWD, and MIAD and is contained within the current APE. Also included in the survey were areas in which the contractor could potentially stage any equipment or materials. Both the records search and survey performed by Pacific Legacy, Inc. concluded with a finding of four cultural resources within the APE for that project, one of which was previously documented (Folsom Dam [CA-SAC-937H]), two that were newly identified (CA-SAC-944H and CA-SAC-945H), and the recordation of the Folsom Dam Dikes (CA-SAC-1103H).

Previously Documented Sites

Folsom Dam (CA-SAC-937H) was deemed eligible for listing on the NRHP (Corps 2006) under Criterion A with a period of significance of 1948 to 1956. Folsom Dam played an integral role in flood control, resulting in significant flood damage reduction for areas downstream, specifically the City of Sacramento. The dam was found not eligible under Criterions B, C, and D. CA-SAC-937H is currently in the process of being listed by Reclamation as a contributing element of the Central Valley Project Multiple Property Listing. Similar to CA-SAC-937H, Folsom Lake Dikes (CA-SAC-1103H), which includes Dikes 1 through 8 and MIAD, has been previously determined by Reclamation as eligible for listing in the NRHP under Criterion A.

Site CA-SAC-944H is located within the APE, within the proposed staging area for Dike 5. This site was originally documented by Reclamation (Welch 2005a) and has since been revisited by archeologists with Pacific Legacy, Inc. in 2006 (Bartoy, *et al*.) and 2007 (Jones) to assess eligibility for listing in the NRHP. The site is an early 20th century trash scatter with a four-walled concrete box structure appearing to serve as a water conveyance function in association with the San Juan Water District. The property was not found to meet any of the criteria for eligibility in its 2007 evaluation (Bartoy, *et al*. 2007a).

Another site located within the Dike 5 Staging area, Site CA-SAC-945H, is a water conveyance system likely constructed in the early 20th century. The site was first recorded by Reclamation (Welch 2005b) and has been revisited by Pacific Legacy, Inc. (Bartoy, *et al*. 2006b) as part of intensive survey and inventory efforts, then again to evaluate the property for listing in the NRHP (Bartoy, *et al*. 2007). Characteristics of the conveyance system included six trapezoidal supports, a concrete intake, and the extant remains of an earthen ditch. The property was not found to meet any of the criteria for eligibility in its 2007 evaluation (Bartoy, *et al.* 2007a).

Field Survey Results

After a thorough review of the records and literature available, Corps personnel conducted cultural resource surveys for the presence of cultural resources within the APE. Large portions of the APE had been previously investigated for the presence of cultural material. Subsurface testing was conducted within reaches of the APE where ground visibility was less than sufficient. Much of the areas within the APE were severely disturbed by construction activities associated with the construction of the reservoir. Historic photographs showed ground-disturbing activities involving heavy grading, road building, staging activities, vegetation removal and a batch plan operation had formally occurred in a majority of the APE (Corps 2004a). The cultural resource survey covered a total of 570 acres. No previously unknown cultural resources were identified during the cultural resource surveys. Existing cultural resources Folsom Dam (CA-SAC-937H), CA-SAC-944H, CA-SAC-945H, and Folsom Dam Dikes (CA-SAC-1103H) are the only known cultural resources within the current APE.

3.12.2 Methodology and Basis of Significance

Analysis of the impacts was based on evaluation of changes to the existing historic properties that would result from implementation of the project. The term “historic property” refers to any cultural resource that has been found eligible for listing, or is listed, in the NRHP. Section 106 of the NHPA requires that Federal agencies evaluate and consider the effects of their undertakings on historic properties. In making a determination of the effects to historic properties, consideration was given to:

- Specific changes in the characteristics of historic properties in the study area.
- The temporary or permanent nature of changes to historic properties and the visual area around the historic properties.
- The existing integrity considerations of historic properties in the study area and how the integrity was related to the specific criterion that makes a historic property eligible for listing in the NRHP.

Basis of Significance

Any adverse effects on cultural resources that are listed or eligible for listing in the NRHP are considered to be significant. Effects are considered to be adverse if they alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the NRHP so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.

In California, effects to a historic resource or unique archaeological resource are considered to be adverse if they materially impair the significance of a historical or archaeological resource.

3.12.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Federal government would not implement the emergency spillway gate modifications or the 3.5-foot raise, and, therefore, would not cause any additional effects to cultural resources. The conditions in the project area would remain consistent with current conditions. If a great enough flood event, or PMF, were to occur, the gates and dam would be at risk for failure, threatening the levee system downstream with a surge of flow beyond the current 160,000 cfs levee capacity and affecting the dam as a historic property. As a result, the No Action Alternative would likely result in an adverse effect to cultural resources. However, the magnitude of the adverse effect would depend on the location of the failure in the system and the severity of the storm. As a result, a precise determination of adverse effect and the significance of the effect is not possible and cannot be made. Because of this uncertainty, this potential effect is considered too speculative for meaningful consideration. Additionally, without a Federal undertaking, under the No Action Alternative there would not be a lead Federal agency required to take into account the effects of a proposed undertaking on historic properties. No further action would be required by the Corps.

3.12.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

The effects of the emergency spillway gate modification and 3.5-foot raise would result in no adverse effects to historic properties located within the APE for the project. There are four previously recorded sites within the APE. CA-SAC-944H is an early 20th century trash scatter and water conveyance structure associated with the San Juan Water District and was determined not eligible for listing in the NRHP in 2007. CA-SAC-945H is an early 20th century water conveyance system and was determined not eligible for listing in the NRHP in 2007. Reclamation submitted these determinations to SHPO, who concurred on July 5, 2007. No further evaluation or consideration of either CA-SAC-944H or CA-SAC-945H is required.

Folsom Dam, including the RWD and LWD (CA-SAC-937H) has been previously determined by the Corps as eligible for listing in the NRHP under Criterion A. SHPO concurred with this determination on June 26, 2006. Folsom Lake Dikes (CA-SAC-1103H), which includes Dikes 1 through 8 and MIAD, has been previously determined by Reclamation as eligible for listing in the NRHP under Criterion A. SHPO concurred with this determination on November 7, 2007. Any federal undertaking is required to determine if the action will result in an alteration, directly or indirectly, to any of the characteristics of these historic properties that qualify them for inclusion in the NRHP.

In accordance with 36 CFR § 800.5 (b) *Finding of no adverse effect,* the construction of the spillway tainter gate modification and combination earthen raise/concrete floodwall would result in no adverse effects to historic properties within the APE. Folsom Dam would undergo physical changes due to the spillway tainter gate modification. Refinements include additional strengthening features to the existing tainter gates and a new "top seal" bulkhead that will prevent overtopping of the spillway gates during a major flood event. These modifications constitute no adverse effect to the qualities that make Folsom Dam eligible for inclusion in the NRHP. Folsom Dam is eligible for inclusion in the NRHP under Criterion A, and the proposed spillway tainter gate modification will have no effect on the capacity of the dam to portray the broad patterns of our history. The proposed modifications, in fact, are designed to enhance the important function of this structure for the purposes of flood control, hydropower, and irrigation.

The RWD and LWD, which are a part of Folsom Dam, and Folsom Lake Dikes, would undergo physical changes due to the earthen raise and concrete floodwall construction. The appearance of Folsom Lake Dikes would be slightly altered by raising the height of the dikes by 3.5-feet and by changing the slopes of the dikes and crest widths to conform to Corps' standards while maintaining Reclamation's requirements for security and maintenance. Materials used for fill would be similar to the existing composition of the earthen dikes, and existing riprap would be reprocessed for use on the raised dike. These modifications constitute no adverse effect to the qualities that make Folsom Lake Dikes eligible for inclusion in the NRHP. Folsom Lake Dikes are eligible for inclusion in the NRHP under Criterion A, and the proposed earthen raise will have no adverse effect on the capacity of the dikes to portray the broad patterns of our history. The proposed modifications, in fact, are designed to enhance the important function of these structures for the purposes of flood control, hydropower, and irrigation.

The appearance of the RWD and LWD would be slightly altered by constructing a reinforced 3.5-foot concrete flood wall that would tie into the main dam, the new control structure, and the existing terrain. This would require excavating a portion of the dam or dike crest to place the footing and to replace the embankment fill. The flood wall would be constructed using cast-in-place, reinforced concrete. The construction of the flood wall constitutes no adverse effect to the qualities that make the RWD and LWD, as part of Folsom Dam, eligible for inclusion in the NRHP. Folsom Dam is eligible for inclusion in the NRHP under Criterion A, and the proposed flood wall will have no adverse effect on the capacity of the dam to portray the broad patterns of our history. The proposed modifications, in fact, are designed to enhance the important function of these structures for the purposes of flood control, hydropower, and irrigation.

The APE for the project also includes areas of ground disturbance, including staging areas, haul routes, recreation trails, and geotechnical borings. The vertical depth of disturbance caused by grading the existing ground for use, and in those areas where the footprint of Dikes 1, 2, 3, 7, and 8, will be expanded. The Corps has assumed potential disturbance of up to 3 feet within the APE where there are not currently built environment resources (Folsom Dam and Folsom Lake Dikes). Observations during the 2015 cultural resources surveys of the APE concluded that much of the areas within the APE were severely disturbed by construction activities associated with the construction of the reservoir. Shovel test pits conducted in areas exhibiting limited ground disturbance did not reveal the presence of any historic properties. As a result, the Corps has determined there will be no adverse effects to historic properties for the project.

3.12.5 Avoidance, Minimization, and Mitigation Measures

Folsom Dam (CA-SAC-937H) and Folsom Lake Dikes (CA-SAC-1103H) are the only known historic properties within the APE that could be potentially affected by the proposed project. Consultation with potentially interested Native Americans did not result in the identification of potential historic properties significant to tribes within the APE, although tribes have indicated that Folsom Lake and the surrounding area are sensitive for sites and locations of importance to them. The Corps' *Finding of no adverse effect* pursuant to 36 CFR § 800.5 (b) will be sent to SHPO for comment and concurrence. Based on these identification and evaluation efforts, there will be no adverse effects to historic properties and no mitigation, avoidance, or minimization measures will be required.

However, if archeological deposits or other potential historic properties are found during project activities, work would be stopped pursuant to 36 CFR § 800.13(b), *Discoveries without prior planning*, to determine the significance of the find and, if necessary, complete appropriate discovery procedures.

CHAPTER 4.0 - CUMULATIVE IMPACTS, GROWTH-INDUCING IMPACTS, AND OTHER REQUIREMENTS

NEPA and CEQA require the consideration of cumulative effects of the proposed action, combined with the effects of the projects. NEPA defines a cumulative effect as an effect on the environment that results from the incremental effects of an action when combined with other past, present, and reasonably foreseeable future actions, regardless of the agency (Federal or non-Federal) or person undertaking such other actions (40 CFR 1508.7). The CEQA Guidelines (CERES 2007) define cumulative effects as "two or more individuals effects, which, when considered together, compound or increase other environmental impacts" (Section 15355).

4.1 Methodology

The cumulative effects analysis determines the combined effect of the proposed project and other closely related, reasonably foreseeable projects. Cumulative effects were evaluated by identifying projects in and around the Folsom Dam vicinity that could have significant, adverse, or beneficial effects. These potential effects are compared to the potential adverse and beneficial effects of the proposed alternative to determine the type, length, and magnitude of potential cumulative effects. Mitigation of significant cumulative effects could be accomplished by rescheduling actions of proposed projects and adopting different technologies to meet compliances. Significance of cumulative effects is determined by meeting Federal and State mandates and specified criteria identified in this document for affect resources.

4.2 Geographic Scope

The geographic area that could be affected by project effects varies depending on the type of environmental resource being considered. An example is air and water resources as they extend beyond the confines of the project footprint; effects on these mediums would not necessarily be confined to the project area. When the effects of the project are considered in combination with those of other past, present, and future projects to identify cumulative effects, the other projects that are considered may also vary depending on the type of environmental effects being assessed. The following are the general geographic areas associated with the different resources addressed in the analysis:

- Air Quality: the air basin under the jurisdiction of SMAQMD as air quality lead.
- Climate Change: the air basin under the Jurisdiction of SMAQMD as air quality lead.
- Water Quality: Folsom Lake

- Fisheries: Folsom Lake
- Aesthetics and Visual Resources: the FLSRA and surrounding neighborhoods in the City of Folsom
- Recreation: the FLSRA
- Traffic and Circulation: the roadways in the project region where traffic generated by multiple projects would interact with the public on a cumulative basis.
- Noise: the area under the jurisdiction of the City of Folsom and Sacramento County.
- Cultural Resources: the APE, as described in Section 3.12, Cultural Resources.

4.3 Past, Present, and Reasonably Foreseeable Future Projects

The projects with the potential to contribute to cumulative effects during construction and operation of the Approach Channel Project are briefly described below. Each of these projects is, or has been, required by Federal, state, and/or local agencies to avoid, minimize, and/or mitigate any significant adverse effects on environmental resources to less than significant, when possible. Those effects that cannot be reduced to less than significant are likely to have a greater cumulative effect. Sequencing and timing of construction for the projects would also affect the cumulative effects.

4.3.1 Folsom Joint Federal Project Activities

Due to the fact that the Join Federal Project (JFP) is a multi-phased, accelerated effort, overlapping construction efforts would occur adjacent to and in the vicinity of the project area throughout the course of construction of the Folsom Dam Raise Project. The concurrent activities onsite include both the various aspects of the Approach Channel work upstream of the control structure, as well as other phases of the JFP to be constructed by both the Corps and USBR. The Folsom Dam Raise Project construction would be calendar years 2017 through 2020. Other activities associated with the Folsom JFP are discussed below.

Phase 1 of Folsom JFP Auxiliary Spillway

Winter 2007 to Sept 2008 included the initiation of the spillway excavation and construction of MIAD haul road, as well as installation of filter material in the top 20 ft of the LWD and RWD. This Phase 1 work was completed under USBR contract as part of JFP project.

Pier Tendon Installation, Spillway Pier Wraps, and Braces and Main Concrete Dam

April 2011 through Spring 2014. These three projects address seismic concerns at the main concrete dam. These improvements are designed to help stabilize the main concrete dam against movement during a major earthquake. This portion of the JFP is covered under the 2007 FEIS/EIR.

Folsom Dam Modification Project Approach Channel

Spring 2013 to Fall 2017. The Approach Channel Project is the final construction activity of Phase IV of the JFP. The primary and permanent structures consist of the 1,100 foot long excavated approach channel and spur dike. A transload facility and concrete batch plant would be constructed as necessary temporary structures to facilitate the construction. Additional existing sites and facilities that would be utilized for the length of the project include the Folsom Prison staging area, the existing Bureau of Reclamation Overlook, the MIAD area, and Dike 7. These sites and facilities are connected by an internal project haul road. Criteria pollutant emissions from the Approach Channel Project and the downstream project would be less than significant for ROG, CO, SO_2, and $PM_{2.5}$, and less than significant with mitigation for PM_{10}. NO_x exceeds the GCR *de minimis* threshold but would be addressed by inclusion in the State Implementation Plan, which would provide compliance with the GCR of the Federal Clean Air Act. The supplemental FEIS/EIR was released for public review in December 2012.

Auxiliary Spillway Excavation

Spring 2009 to Fall 2010. Major work under Phase II of the JFP includes partial excavation of the western portion of the auxiliary spillway, construction of the downstream cofferdams, relocation of the Natoma Pipeline, and the creation of an access road to the stilling basin. This portion of the JFP is covered under the 2007 EIS/EIR. Construction was conducted by the United States Bureau of Reclamation (USBR) and was completed prior to the start of the Control Structure construction effort.

Control Structure, Chute, and Stilling Basin

Spring 2011 to Fall 2017. Phase III of the JFP consists of construction of the auxiliary spillway control structure. This effort is currently under construction by the Corps and would be complete approximately Fall 2014. Concrete lining of the spillway chute and stilling basin would be conducted by the Corps as the final phase of the JFP. These actions would be constructed from approximately Summer 2013 to Fall 2017. Construction of the control structure and the concrete lining of the chute and stilling basin were all covered under the Corps' 2010 EA/EIR (Corps 2010).

Dike 1 Modification Project

Winter 2014 to Spring 2015. The Dike 1 Modification is a portion of the Folsom Dam Safety Project that was approved in 2005 to address seepage exiting from downstream of Dike 1. Reclamation concluded that the seepage is likely occurring through the foundation and is being collected by the downstream horizontal blanket drain and exiting onto the ground surface at the toe. Modifications to Dike 1 include constructing a downstream overlay with sand chimney filter and toe drain to prevent internal erosion under flood loading conditions.

4.3.2 Folsom Dam Water Control Manual Update

The Water Control Manual Update is being completed in conjunction with the JFP by the Corps, USBR, CVFPB, and SAFCA. The Water Control Manual Update for Folsom Dam would develop, evaluate, and recommend changes to the flood control operations at Folsom Dam that would further reduce flood risks to the Sacramento area. Operational changes may be necessary to fully realize the flood risk reduction benefits of the following:

- The additional operational capabilities created by the auxiliary spillway.
- The use of improved forecasts from the National Weather Service.

Further, the Water Control Manual Update would evaluate options for the inclusion of creditable flood control transfer space in Folsom Reservoir in conjunction with Union Valley, Hell Hole, and French Meadows Reservoirs (also referred to as Variable Space Storage), the potential for improved releases for fish flows, and possibly increased flexibility of water storage during drought periods. The study would result in a Corps decision document and would be followed by a water control manual implementing the recommendations of the Study. It should be recognized that the initial water control manual would implement the recommendation of the study but would not include the capabilities to be provided by the Dam Raise and additional Common Features project improvements until such time as these projects have been completed.

4.3.3 Other Projects

Dike 4, 5, and 6 Repairs, USBR Dam Safety

Summer 2009 to October 2010. To address seepage concerns due to static and hydrologic loadings for Dikes 4 and 6, USBR installed full height filters, toe drains, and overlays on the downstream face of each earthen structure. This portion of the JFP is covered under the 2007 Folsom Dam Safety and Flood Damage Reduction Project EIS/EIR (2007 EIS/EIR).

Mormon Island Auxiliary Dam Modification Project

The project has been underway from Summer 2010 to December 2015. USBR released the Draft EIS/EIR for the MIAD Modification Project in December 2009. Four action alternatives were analyzed in the MIAD Draft Supplemental EIS/EIR. The preferred MIAD action alternative of jet grouting selected in the FEIS/EIR was determined to be neither technically nor economically feasible. The preferred alternatives addressed methods to excavate and replace the MIAD foundation, place an overlay on the downstream side, and install drains and filters; the alternatives differ only in their methods of excavation. In addition, the alternative in the Final Supplemental EIS/EIR include habitat mitigation proposed for up to 80 acres at Mississippi Bar on the shore of Lake Natoma to address impacts from the JFP.

Johnny Cash Folsom Prison Blues (Folsom Lake) Trail: Historic Truss Bridge to Green Valley Road Segment

This project is planned to provide approximately 2.5 miles of Class I bike trail from the Historic Truss Bridge to Green Valley Road. A majority of the trail alignment would be within the Folsom Prison property. The project is broken into three major segments consisting of:

- Phase 1 – Folsom Lake Crossing bike/pedestrian overcrossing to the Hancock Drive intersection (currently under construction).

- Phase 2 – Folsom Prison entry road to Rodeo Park (existing trail end).

- Phase 3 – Hancock Drive intersection to the Folsom Prison entry road.

- Phase 4 – Folsom Lake Crossing bike/Pedestrian overcrossing to the El Dorado County Line

Incorporation of a separated grade crossing at the new Folsom Lake Crossing/East Natoma Street realignment was included within the new bridge crossing construction. Construction began in 2011, with continued work expected through the early years of the Folsom Dam Raise project.

Widening of Green Valley Road

Green Valley Road runs between both the City of Folsom and El Dorado County. Both agencies have proposed projects to widen Green Valley Road from two to four lanes. The El Dorado County Green Valley Road widening project from the county line to Francisco Drive was constructed prior to 2009, with environmental mitigation to be completed from 2009 to 2012 (El Dorado County 2010). The City of Folsom plans to widen Green Valley Road; however, the ongoing construction of the Bureau's MIAD Modification Project limits their ability to conduct the road widening project. There is currently an environmental compliance documentation but no construction schedule for the project within the City of Folsom. The project could take four years to construct.

El Dorado 50 – HOV Lanes

California Department of Transportation would construct bus-carpool (HOV) lanes in the eastbound and westbound directions by widening U.S. Highway 50 from approximately El Dorado Hills Boulevard to just west of Greenstone Road. The project would ultimately extend the current HOV lane system to provide approximately 23 continuous miles of eastbound and westbound HOV lanes between Sacramento and El Dorado counties. The project also includes bridge modification, lighting improvements, and new asphalt overlay. The project would be constructed in three phases: Phase 1 would extend the current HOV lanes from their existing terminus west of El Dorado Hills Boulevard, to west of Bass Lake Road with construction started in fall 2008 and completion scheduled for fall 2011; Phase 2 would extend the lands from west of Bass Lake Road to approximately Ponderosa Road with construction targeted to begin in Summer 2013 and completion in Fall 2015; Phase 3, currently on hold pending determination of funding source, would extend the lands from Ponderosa Road to Greenstone Road (Caltrans 2012).

Hazel Avenue Improvement Project

Sacramento Department of Transportation completed Phase 1 of the Hazel Avenue Improvement Project. The primary portion of Phase 1 involved the widening of Hazel Avenue from four to six lanes over the American River Bridge from U.S. 50 to Curragh Downs Drive. Construction was completed in 2010. Phase 2 of the Hazel Avenue Projects includes widening Hazel Avenue from four to six lanes from Curragh Downs Drive to Madison Avenue. This phase would also include traffic signal modification at Curragh Downs Drive, Winding Way, La Serena Drive, the fire station at Roediger Lane, and a new signal at Phoenix Avenue. Construction of Phase 2 is targeted to begin in 2015 with completion in 2017.

4.4 Cumulative Effects

This section discusses the potential cumulative effects of the Folsom Dam Raise Project when added to other past, present, and reasonably foreseeable future actions. If the project is not expected to contribute to a cumulative effect on a resource, that resource is not addressed.

Resources include recreation, vegetation and wildlife, special status species, water quality, air quality, climate change, aesthetics and visual resources, traffic and circulation, noise, and cultural resources.

4.4.1 Air Quality

The Folsom Dam Raise Project's construction period (2017-2021) would overlap with other JFP construction activities, including the Approach Channel Project (2012-2017) and the control structure, chute, and stilling basin projects (2010-2016). These other activities are considered to be a codependent project subject to evaluation for the General Conformity Rule by the USEPA.

Other concurrent projects are considered discrete projects outside the consideration of the general conformity ruling for the Folsom Dam Raise Project. Long-term emissions associated with the completion of the JFP would be analyzed in associated environmental documents, such as the Folsom Dam Modification Project Approach Channel Supplemental EIS/EIR and the 2007 Folsom Dam Safety and Flood Damage Reduction Project EIS/EIR. However, it is anticipated that any long-term emissions associated with operations of the auxiliary spillway would be below State and Federal thresholds and would not significantly contribute to the overall cumulative impacts.

Combined JFP Analysis

This section discusses the quantitative analysis of the cumulative short-term air quality effects of the Folsom Dam Raise Project alternatives in combination with the other features of the JFP. Qualitative discussions of the cumulative effects of the Approach Channel Project and the other projects identified in Section 4.3 are also included. Prior cumulative air quality effects from the 2007 EIS/EIR did not address the Folsom Dam Raise Project alternatives and other regional projects in depth. Air emission models, project elements, the NOx *de minimis* threshold, and resulting calculated emissions differed substantially between the 2007 EIS/EIR and the current JFP project.

Construction of the proposed alternatives would result in emissions of criteria pollutants. However, with the implementation of mitigation measures, these emissions are expected to be less than significant. With the exception of the Folsom Dam Water Control Manual Update, which has no construction associated with it, all of the related projects discussed above would cumulatively contribute to emissions of criteria pollutants throughout the region, particularly if they are constructed concurrently, which could have a significant cumulative effect on air quality. It is anticipated that each of these projects would implement their own mitigation plan to reduce the emissions to below the significance levels.

It is likely that the Dam Raise Project would be constructing at the same time as the Folsom Dam Modification Project Approach Channel and the post-construction restoration. It would be necessary to ensure that the projects are not constructing sites in close proximity to one another at the same time. However, on a regional level, these projects would still contribute to a significant cumulative effect and coordination with the SMAQMD and USBR would need to occur prior to construction to reduce these effects.

4.4.2 Climate Change

It is unlikely that any single project by itself would have a significant impact on the environment with respect to GHGs. However, the cumulative effect of human activities has been linked to quantifiable changes in the composition of the atmosphere, which, in turn, has been shown to be the main cause of global climate change (IPCC 2007). Therefore, the analysis of the environmental effects of GHG emissions is inherently a cumulative impact issue. While the emissions of one single project would not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative effect with respect to global climate change.

It is expected that the primary impacts from these concurrent projects would be due to construction activities. On an individual basis, each of these projects would mitigate emissions below the general reporting threshold. If these projects are implemented concurrently, it is possible that the combined cumulative effects could be above reporting requirements for GHG emissions. However, with the implementation of mitigation measures, which would be required for each of these projects, it is possible that the effects could be reduced to less than significant.

In addition, the majority of the related projects are flood risk management projects. By implementing these projects, the action agencies would be reducing potential future emissions associated with flood fighting and future emergency actions. As a result, the related projects could combine to reduce long-term potential GHG emissions in the Sacramento region. As a result, the overall cumulative GHG emissions from these projects are considered to be less than significant.

4.4.3 Aesthetics and Visual Resources

Cumulative impacts to aesthetics and visual resources are primarily related to other construction projects that have already occurred or could occur in the future within the vicinity of the study area and result in loss of visual quality both during and after construction. There would be some overlap with the construction of other projects as mentioned above (*e.g.* Folsom Dam Modification Project Approach Channel). Concurrent construction of the Folsom Dam Raise Project would result in short-term cumulative effects in the visual resources in the project area. Additional vegetation clearing, earth moving, construction equipment, and stockpile from the projects could contribute to a larger, temporary overall visual impact. However, cumulative effects are expected to be less than significant because Folsom Lake's southern shoreline is of low visual quality and other large man-made features (such as the main dam) are already well established in the landscape.

4.4.4 Water Quality

Water quality to be affected within the actual construction area. Construction activities such as rock placement, clearing and grubbing, and slope realignment have the potential to temporarily degrade water quality through the direct release of soil and construction materials into water bodies, or the indirect release of contaminants into water bodies through runoff. Related projects, including the American River Common Features and the Folsom Dam Modification Project Approach Channel, could be under construction during the same timeframe as the Folsom Dam Raise Project. If construction occurs during the same timeframe, water quality could be diminished primarily due to increased turbidity. All projects would be required to coordinate with the RWQCB and overall water quality would be required to meet the Basin Plan objectives. These projects, however, would culminate in long-term beneficial impacts for flood damage reduction and dam safety. There are no anticipated long-term water quality affects with the implementation of multiple projects.

4.4.5 Recreation

Cumulative impacts to recreation were primarily related to other construction projects that could occur during the same timeframe as those considered for this study, and within the same vicinity as this study. At the time of this analysis, some projects have the potential to increase recreational access on a long-term basis (*e.g.* Johnny Cash Folsom Prison Blues (Folsom Lake) Trail), and some have the potential to have short-term impacts (*e.g.* Folsom Dam Modification Project Approach Channel). The Johnny Cash Folsom Prison Blues (Folsom Lake) Trail would increase bicycle and pedestrian access from the Historic Truss Bridge to Green

Valley. Future construction of the bike trail has the potential to have a significant, long-term positive effect upon recreation and public access to the FLSRA.

The Mormon Island Auxiliary Dam Modification is currently being constructed and is schedule to be completed in December of 2015. This project would produce short-term impacts to recreation. The Folsom Dam Modification Project Approach Channel started in 2013 and is going to continue through 2017, therefore the construction periods of these projects and the Folsom Dam Raise Project would overlap. The Approach Channel would impact water-based activities during the construction period. The trails atop MIAD and the associated parking lots would be closed to the public during construction due to potential public safety hazards at the construction site. Visitors would need to park at Brown's Ravine or find alternate parking areas. While these projects would have a cumulative effect on recreation, the Folsom Dam Raise Project would only temporarily impact land-based activities, whereas the Approach Channel construction would impact water-based activities. Because the projects affect different recreation activities, and the Folsom Dam Raise Project and MIAD Modification Project impacts would be temporary, it is not expected that visitation would be substantially reduced and cumulative effects are considered less than significant.

4.4.6 Vegetation and Wildlife

Implementation of the Folsom Dam Raise Project has the potential to remove large amounts of vegetation within the project area. The Folsom JFP, the MIAD Modification Project, and the Folsom Dam Modification Project Approach Channel Project would also require the removal of habitat within the Folsom area. These affects, along with the historical decline of vegetation due to urbanization, would result in significant cumulative effects.

The avoidance, minimization, and mitigation measures would be implemented in accordance with the recommendations of the Coordination Act Report for the Dam Raise Project. Additionally, all the projects would include avoidance, minimization, and mitigation measures. However, potential adverse effects on biological resources would remain significant due to the amount of habitat being removed to construct these projects and the time lapse before new plantings would mature to the level of those removed. Once all the mitigation and compensation plantings have matured to the level of those removed, the affects to vegetation and wildlife would be less than significant, but the temporary loss of vegetation along the levees would be significant. There is no designated critical habitat for VELB in the project area.

4.4.7 Sensitive Species

Potential cumulative impacts from the combination of these projects to each of the listed species included in this consultation are below. During preconstruction engineering and design, the Corps designs would avoid impacts to special status species, where possible, or otherwise minimize effects to each of these species.

Valley Elderberry Longhorn Beetle

Concurrent construction of multiple projects over the next 10 to 15 years within the Sacramento area would likely cause mortality to beetles due to construction operations. Construction activities for the multiple projects would occur each year during the flight season of beetles. Since construction activities would be adjacent to known VELB locations, it is likely that some mortality may occur. The exact number injured or killed is unknown but would likely be minimal due to the exceptional flight ability of the beetle to avoid construction vehicles. No designated critical habitat would be affected with the construction of any of the projects.

Shrubs within each past, current, and potential future project footprints at Folsom Lake would be transplanted to areas in close proximately to the current locations as needed and required by USFWS. Additionally, compensation would be located within the vicinity of impacted shrubs. Transplanting of shrubs and planting of seedlings and native plant species within the project vicinity would provide connectivity for the beetle. Connectivity is a primary cause of the beetle decline and an important element in the recovery and sustainability of the beetle. The transplanting of shrubs and compensation within the same area as the potential impacts would result in effects to the beetle but not result in permanent jeopardy to the Valley Elderberry Longhorn Beetle.

Bald Eagle

Concurrent construction of multiple projects over the next 10 to 15 years within the Sacramento area would not likely cause any impacts to the bald eagle. The Folsom Dam Project area for the Folsom Dam Raise and many other concurrent projects (e.g. the Approach Channel and the MIAD Modification Project) are all highly disturbed areas and do not provide quality habitat for the eagle. No critical habitat has been designated for this species and the proposed project would not have a direct or indirect effect on the growth, survival, or reproductive success of the bald eagle. There would be no cumulative effects caused by the Folsom Dam Raise project.

Swainson's Hawk

Concurrent construction of multiple projects within the Folsom Lake area would not likely cause any impacts to the Swainson's hawk. The Swainson's hawk is known to occur in the vicinity Folsom Dam and Reservoir, thus could be a concern for many of the projects in the area. However, there have been no recorded nesting sites above the Nimbus Dam on the American River. In addition, the staging and construction areas for this project and others in progress, or areas planned for the future, are highly disturbed and do not provide high quality habitat for this species. No critical habitat has been designated for this species, and the proposed project would not have a direct or indirect effect on the growth, survival, or reproductive success of the Swainson's hawk. There would be no cumulative effects caused by the Folsom Dam Raise project.

4.4.8 Traffic and Circulation

There are several short-term projects that have the potential to effect traffic. The Hazel Avenue Improvement Project, the widening of Green Valley Road, and the Folsom Bridge Project are completed projects that have benefited traffic volumes. There is potential for future projects in the vicinity of Folsom Lake to affect traffic, and some would be constructed concurrently with the proposed action. The Approach Channel and the MIAD Modification Projects, both in progress, have had some temporarily increased traffic levels from the transport of materials and the labor force's shift work. Construction of the proposed project would temporarily increase traffic on some local, regional roadways.

While there would be a cumulative effect of the concurrent projects impacts on freeways and other regional roadways, these roadways are designed to handle increased traffic loads and the effect would be less than significant. There is enough distance in time between other local projects that impacts to local roadways would not create a significant cumulative effect. With the implementation of avoidance and minimization measures, the project is not expected to result in a cumulatively considerable increase of traffic and be less than significant. This is pending final routes being identified and analyzed, and would be included in a subsequent environmental document, if needed.

4.4.9 Noise

There is the potential for future construction activities in the vicinity of the Folsom Dam and Reservoir to be constructed concurrently with the proposed action and other concurrent projects. This project and other local projects would result in temporarily increased levels of ambient noise in the study area. Simultaneous construction of projects would increase noise levels from the onsite construction and the transport of materials. However, the effects would be limited to the people in the immediate proximity to the construction sites and none of the local projects are in close enough proximity to the various proposed construction sites to create a cumulative effect. If there are any projects constructing within audible distance from one another, the USACE and BOR teams for these projects would coordinate to ensure that both projects are not constructing at the same time. With this coordination, there would be no cumulative effects due to noise in the study area.

4.4.10 Cultural Resources

Cumulative impacts to cultural resources would be primarily related to individual ground disturbance sites, with potential regional implications for sites if they are considered part of a historic district, landscape, or multiple sites that may be ethnographically significant, and to other construction projects that could occur during the same timeframe as those considered for this study and within the same vicinity. For this project, the Corps has determined there will be no adverse effects to historic properties. Federal undertakings are required to avoid, minimize, and/or mitigate any significant adverse effects on cultural resources. At the time of this analysis, there are several ground disturbing construction projects anticipated that could result in adverse effects to historic properties that have not yet been identified as part of those projects. As a result, the cumulative overall impact to non-renewable cultural resources is possible, as well as significant and unavoidable. Individual projects would implement separate mitigation measures that would address the effects caused by these projects. Although mitigation would minimize these impacts, there is still a possible significant cumulative effect to cultural resources.

4.5 Growth Inducing Impacts

NEPA and CEQA both require a discussion on how a project, if implemented, could induce growth. This section presents an analysis of the potential growth-inducing effects of the proposed project. Direct growth inducement would result if a project involved construction of new housing. Indirect growth inducement would result, for instance, if implementing a project results in any of the following:

- Substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises);

- Substantial short-term employment opportunities (e.g., construction employments) that indirectly stimulates the need for additional housing and services to support the new, temporary employment demand; and/or

- Removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service (e.g., construction of a major sewer line with excess capacity through an undeveloped area.

Growth inducement may lead to environmental effects, such as increased demand for utilities and public services, increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, and conversion of agricultural and open space land to urban uses. Growth within a floodplain area increases the risk to people or property from flooding.

Within the study area, growth and development are controlled by the local governments of the City of Folsom, and Sacramento, El Dorado, and Placer Counties. Consistent with California law, each of these local governments has adopted a general plan and each general plan provides an overall framework for growth and development within the jurisdiction of each local government. Local, regional, and national economic conditions also directly affect growth and development.

The alternatives currently being considered for the Folsom Dam Raise Project would not contribute directly to population or economic growth as no additional housing or businesses would be built. However, the overall Folsom Dam Safety and Flood Damage Reduction Project (including the JFP and other aspects of the Folsom Dam project) would generate additional economic benefits during construction and would contribute to greater flood risk management for the Sacramento area once complete. The potential for any growth-inducing effects associated with the overall JFP were analyzed under the 2007 FEIS/EIR (USBR 2007).

The Folsom Dam Raise Project is of a limited scope and would not promote or contribute to any regional economic or population growth. Any future local growth would be consistent with the local general plans, as described above.

4.6 Unavoidable Adverse Effects

State CEQA Guidelines CCR Section 21100(b)(2)(A) provides that an EIR shall include a detailed statement setting forth "any significant effects on the environment that cannot be avoided if the project is implemented." Chapter 2 provides a detailed analysis of all potentially significant environmental impacts of the Folsom Dam Raise Project, feasible mitigation measures that could reduce or avoid the project's impacts, and whether these mitigation measures would reduce these impacts to less than significant levels. Cumulative impacts are discussed above. If a specific impact cannot be reduced to less than significant level, it is considered a significant and unavoidable impact.

The Folsom Dam Raise would have the following significant and unavoidable environmental effects (direct, indirect, and/or cumulative):

- Traffic on public roadways;
- Some loss of vegetation and wildlife habitat along the dikes;
- Potential loss/removal of elderberry shrubs;
- Noise
- Temporary closure of recreation facilities including bike and walking trails during construction;

4.7 Relationship of Short-Term Uses and Long-Term Productivity

NEPA requires that an EIS include a discussion of the relationship between short-term uses of the environmental and long-term productivity. Within the context of the EIS/EIR “short-term” refers to the construction period, while “long-term” refers to the operational life of the project and beyond.

Project construction would result in short-term construction-related effects such as interference with local traffic and recreation facilities, increased air emissions, ambient noise level, and dust, yet are not expected to alter the long-term productivity of the natural environment. Project implementation would also result in long-term effects, including changes in visual resources, however minimal.

Project implementation would contribute to long-term productivity of the environment by improving the dike system and the spillway gates that maintain flood protection to the downstream area by reducing the overall flood risk.

The long-term beneficial effects of the project would outweigh its potentially significant short-term impacts to the environment.

4.8 Irreversible and Irretrievable Commitment of Resources

NEPA requires that an EIS include a discussion of the irreversible and irretrievable commitments of resources which may be involved should the project be implemented. Similarly, the State CEQA Guidelines require a discussion of the significant irreversible environmental changes that would be caused by the project should it be implemented.

The irreversible and irretrievable commitments of resources are a permanent loss of the resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled, or those that are consumed or reduced to unrecoverable forms. Project implementation would result in the irreversible and irretrievable commitments of energy and material resources during the project construction and maintenance, including the following:

- Construction materials, including such resources as soil and rocks;
- Land and water area committed to new/expanded projects facilities; and
- Energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction, operation, and maintenance.

The use of these nonrenewable resources is expected to account for only a small portion of the region's resources and would not affect the availability of these resources for other needs within the region. Construction activities would not result in inefficient use of energy or natural resources.

As described throughout this DSEIS/SEIR, without implementation of the Folsom Dam Raise Project, the reduction of flood risk benefits would remain. While a precise quantification of impacts associated with flood risk reduction is not possible, there is a potential for a variety of impacts. Flooding and the resulting emergency and reconstruction efforts could expend more energy, overall, than with construction of the Folsom Dam Raise Project. A large volume of debris would result from a flood event; such things as cars, appliances, housing materials, and vegetation would all be generated during a flood event and would likely have to be disposed of in a landfill. After debris removal is completed, re-building would occur and new materials would be required to repair and/or construct homes, businesses, roads, and other urban infrastructure. Thus, project implementation preempts potentially substantial future consumption and is likely to result in long-term energy and materials conservation.

CHAPTER 5.0 - COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

This chapter summarizes the environmental laws and regulations that apply to the Folsom Dam Raise Project and describes the status of compliance with those laws and regulations. The project would not only comply with the Federal environmental laws and regulations, but would comply with all state, regional, and local laws, regulations, and ordinances.

5.1 Federal Laws, Regulations, and Policies

Clean Air Act of 1972, as amended (42 U.S.C. 7401, et seq.)

Partial compliance. The Federal 1970 Clean Air Act (CAA) authorized the establishment of national health-based air quality standards, and also set deadlines for their attainment. The Federal Clean Air Act Amendments of 1990 (1990 CAA) made major changes in deadlines for attaining National Ambient Air Quality Standards (NAAQS). State and local agencies, within areas that exceed the NAAQS, are required to develop state implementation plans (SIPs) to show how they would achieve the NAAQS for nonattainment criteria pollutants by specific dates. SIPs are not single documents; rather, they are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls. USEPA is responsible for enforcing the NAAQS primarily through reviewing SIPs that are prepared by each state. As required by the Federal CAA, the USEPA has established and continues to update the NAAQS for specific criteria air pollutants: O_3, CO, NO_2, SO2, PM10, PM2.5, and Pb.

Pursuant to CAA Section 176(c) requirements, USEPA promulgated the General Conformity Rule which applies to the most federal actions, including the Folsom Dam Raise Project. The General Conformity Rule is used to determine if Federal actions meet the requirements of the CAA and applicable SIPs by ensuring that pollutant emissions related to the action do not:

- Cause or contribute to new violations of a NAAQS.
- Increase the frequency or severity of any existing violation of a NAAQS.
- Delay timely attainment of a NAAQS or interim emission reduction.

A conformity determination under the General Conformity Rule is required if the Federal agency determines: the action would occur in a nonattainment or maintenance area; that one or more specific exemptions do not apply to the action; the action is not included in the Federal agency's "presumed to conform" list; the emissions from the proposed action are not within the approved emissions budget for an applicable facility; and the total direct and indirect emissions of a pollutant (or its precursors) are at or above the *de minimis* levels established in the General Conformity Regulations.

For the Folsom Dam Raise Project, the entire construction footprint of Dikes 1 through 8, the LWD, RWD, and MIAD, along with the Emergency Spillway, were analyzed under the CAA. For this footprint, emissions associated with the dike raises, the concrete floodwalls, and the emergency spillway modifications construction equipment were analyzed to determine the worst case scenario for air quality impacts. The analysis conducted determined that the emissions associated with construction of this action would be above the *de minimis* level. These emission reductions were incorporated into the project analysis. Even with implementation of mitigation measures identified in Section 3.6, emissions would not be reduced below the USEPA's general conformity *de minimis* threshold. Based upon preliminary analysis of air quality effects from the proposed action, it was evident that mitigated construction actions would result in exceeding SMAQMD standards for NOx, and CO_2. Compliance with the CAA would be accomplished with the completion of a General Conformity Analysis, or with the inclusion in the State Implementation Plan.

Federal Sustainability in the Next Decade, Executive Order 13693, March 19, 2015

Full Compliance. Signed on March 15, 2015, Federal agencies are directed to promote building energy conservation, efficiency, and management, and reduce energy use by vehicle fleets. Federal agencies shall also reduce greenhouse gas emissions and increase water efficiency in industrial, landscape, agricultural and potable water uses. Specific percentage goals by year are established. The Corps is requiring lower emission producing equipment for use in construction.

Clean Water Act of 1972, as amended (33 U.S. C. 1251, et seq.)

Partial Compliance. The potential effects of the proposed project on water quality have been evaluated and are discussed in Section 3.11. Prior to construction, the contractor would prepare and implement a Stormwater Pollution Protection Plan (SWPPP). The SWPPP would help identify the sources of sediment and other pollutants, and establish BMPs for storm water and non-storm water source control and pollutant control. Additionally, compliance with the CWA would be accomplished by obtaining certification through the CVRWQCB and internally through the Corps. As part of the permits, contractors would be required to implement best management practices to avoid and minimize any adverse effects of construction on surface waters. The following National Pollutant Discharge Elimination System (NPDES) permits would be obtained:

1. Storm Water Permit: NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.

2. Industrial Storm Water Permit: NPDES General Permit for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities.

3. Limited Threat Discharge Permit: NPDES Permit for Limited Threat Discharges of Treated/Untreated Groundwater to Surface Water.

Once the work is completed, the contract would submit a Notice of Termination in order to terminate coverage by the NPDES permit. As there is currently no in-water disposal areas, 404(b)(1) would not be necessary. However, if project changes allow for the need of lakeside disposal areas, a 404(b)(1) would be completed by the Corps.

Clean-fuel Vehicle Tailpipe Emission Standards for Light-Duty Vehicles and Light-duty Trucks (40 CFR 88.104-94)

Full compliance. A light-duty vehicle or light-duty truck will be considered as a TLEV, LEV, ULEV, or ZEV if it meets the applicable requirements of the emission standards. Vehicles for the project would meet the standards as defined by 40 CFR 88.104-94.

Endangered Species Act of 1973, as amended (16 U.S.C. 1531. et seq.)

Partial Compliance. A list of the threatened and endangered species that have the potential to occur in the Folsom area was obtained USFWS on January 21, 2015. Based on the analysis contained in this document, the Corps has determined that the project has the potential to affect the Federally-listed Valley Elderberry Longhorn Beetle if the work on Dikes 1, 5, 6, and the Right Wing Dam are to be done. If the proposed work is to move forward, the Corps would initiate consultation with USFWS under Section 7(a) of the Endangered Species Act to assess the impacts to VELB and determine appropriate mitigation measures. Either USFWS consultation and/or receipt of a Biological Opinion or letter of concurrence, or the decision to eliminate this work, would constitute full compliance with this law. There are no additional potential effects to Federally-listed species beyond the VELB and elderberry shrubs in the mentioned locations.

Executive Order 11988: Flood Plain Management

Full Compliance. The objective of this E.O. is to avoid, to the extent possible, any long term and short-term adverse effects associated with the occupancy and modification of the base floodplain (1% annual event), and to avoid direct and indirect support of development in the base floodplain wherever there is a practicable alternative. While the proposed project reduces flood risk to the population in the study area, it also removes an obstacle to growth for portions of the study area that are slated for redevelopment and are within the base floodplain. The Dam Raise, in combination with other area flood risk reduction projects, protects the existing urban population of the greater Sacramento area. Modifying existing structures such as the Folsom

Facility was determined to be the only practicable alternative to address the specific dam safety and flood management issues at Folsom. There is no practicable alternative that does not indirectly induce development in the flood plain by removing flood risk as an obstacle to growth, therefore the project is in compliance with the E.O.

Executive Order 11990: Protection of Wetlands

Full Compliance. Executive Order 11990, signed May 24, 1977, directs all Federal agencies to refrain from assisting in or giving financial support to projects that encroach on publicly or privately owned wetlands. It further requires that Federal agencies support a policy to minimize the destruction, loss, or degradation of wetlands. A project that encroaches on wetlands may not be undertaken unless the agency has determined that 1) there are no practicable alternatives to such construction, 2) the project includes all practicable measures to minimize harm to wetlands that would be affected by the project, and 3) the effect would be minor.

During a 2014 survey, less than 1 acre of seasonal wetland habitat was identified adjacent to the project area to the west of Dike 6. No other wetlands were identified throughout the rest of the project area during this survey. These wetlands would not be directly impacted by any project activities. There is the potential for fugitive dust to affect the wetlands; however, dust suppression measures would be implemented throughout project construction. With the implementation of the dust suppression measures listed in Section 3.4, there would be no adverse effects to wetlands in the vicinity of the project area.

Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

Full Compliance. This Executive Order states that Federal agencies are responsible for conducting their programs, policies, and activities that substantially affect human health of the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. The proposed construction project is located on public lands and is not located near any minority or low income communities. The benefits of the Dam Raise would extend to all areas of the greater Sacramento area; therefore it would not provide disproportionate burdens, benefits, or effects to any minority or low income populations and is in compliance with this Executive Order.

Executive Order 13112: Invasive Species

Full Compliance. Executive Order 13112, signed February 3, 1999, directs all Federal agencies to prevent and control the introduction of invasive species in a cost-effective and environmentally sound manner. The order established the National Invasive Species Council, which is composed of Federal agencies and departments, and the supporting Invasive Species Advisory Committee which is composed of state, local, and private entities. The council's national invasive species management plan recommends objectives and measures to implement Executive Order 13112 and to prevent the introduction and spread of invasive species (National Invasive Species Council 2008). Executive Order 13112 requires consideration of invasive species in NEPA analyses, including their identification and distribution, their potential effects, and measures to prevent or eradicate them.

Farmland Protection Policy Act (7 U.S.C. 4201, et seq.)

Full Compliance. There are no designated prime or unique farmlands within the project area; therefore there would be no adverse effects to farmland and the project is in compliance with this Act.

Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661, et seq.)

Partial Compliance. Federal agencies undertaking water projects are required to fully consider recommendations made by the USFWS in the provided Coordination Act Report (CAR) or Planning Aid Letter associated with the project. USFWS and CDFG have participated in evaluating the proposed project, and USFWS has prepared a preliminary draft CAR which accompanies this document (Appendix E). Inclusion of the final CAR and consideration of USFWS recommendations would accomplish full compliance with this law

Migratory Bird Treaty act of 1936, as amended (16 U.S.C. 703, et seq.)

Full Compliance. The Migratory Bird Treaty Act implements various treaties and conventions between the United States, Canada, Japan, Mexico, and Russian, providing protection for migratory birds as defined in 16 U.S.C. 715j. The proposed action is located in an ongoing construction area, which has been active since 2008. There is potential nesting habitat located in the woodland (oak) habitat scattered throughout the project footprint. The project is in a very urbanized area where traffic congestion and human activities are very common. Birds in these areas have adjusted to the human environment and continue to nest in areas with multiple human activities occurring. To ensure that the project does not affect migratory birds, preconstruction surveys would be conducted by a qualified biologist in areas adjacent to the project site. If breeding birds are found in the area, a protective buffer would be delineated and USFWS and CDFG would be consulted for further actions.

National Environmental Policy Act of 1969, as amended (42 U.S. C. 4321, et seq.)

Partial Compliance. NEPA applies to all Federal agencies and most of the activities they manage, regulate, or fund that affect the environment. This act requires full disclosure of the environmental effects, alternatives, potential mitigation, and environmental compliance procedures of proposed actions NEPA requires the preparation of an appropriate document to ensure that Federal agencies accomplish the law's purposes. This draft DSEIS/SEIR constitutes partial compliance with NEPA. Full compliance would be achieved when the final SEIS/EIR is filed with USEPA and the Corps issues a Record of Decision.

Noise Control Act of 1972, as amended (42 U.S.C. 4901 et seq.)

Full Compliance. Inadequately controlled noise presents a growing danger to the health and welfare of the Nation's population, particularly in urban areas. The major sources of noise include transportation vehicles and equipment, machinery, appliances, and other products in commerce. The Noise Control Act of 1972 establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The Act also serves to (1) establish a means for effective coordination of Federal research and activities in noise control; (2) authorize the establishment of Federal noise emission standards for products distributed in commerce; and (3) provide information to the public respecting the noise emission and noise reduction characteristics of such products.

While primary responsibility for control of noise rests with State and local governments, Federal action is essential to deal with major noise sources in commerce, control of which requires national uniformity of treatment. EPA is directed by Congress to coordinate the programs of all Federal agencies relating to noise research and noise control.

Title 23 of the U.S. Code (USC)

Federal statutes specify the procedures that the U.S. Department of Transportation must follow in setting policy regarding the placement of utility facilities within the rights-of-way of roadways that received Federal funding. These roadways include expressways, most State highways, and certain local roads. In addition, 23 USC 116 requires State highway agencies to ensure proper maintenance of highway facilities, which implies adequate control over non-highway facilities such as utility facilities. Finally, 23 USC 123 specifies when Federal funds can be used to pay for the costs of relocating utility facilities in connection with highway construction projects.

Title 23 of the Code of Federal Regulations (CFR)

Federal Highway Administration (FHWA) regulations require that each state develop its own policy regarding the accommodation of utility facilities within the rights-of-way of such roads. After FHWA has approved a state’s policy, the State can approve any proposed utility installation without referral to FHWA, unless utility installation does not conform to the policy.

Federal regulations do not dictate specific levels of operation or minimum delays, however, which are primarily established by local jurisdiction.

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470)

Partial Compliance. Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of a proposed undertaking on properties that have been determined to be eligible for, or included in, the National Register of Historic Places (NRHP). If cultural resource(s) have been identified during a survey, a records and literature search, through consultation, or by other means, the federal agency overseeing the project begins the process to determine whether the cultural resources are eligible for listing in the NRHP. Section 106 of the NHPA, as amended, mandates the evaluation process. The implementing regulations for Section 106 are at 36 C.F.R. § 800 et seq.

Inventory, evaluation for listing in the NRHP, and determinations of effects to cultural resources, are made by Federal agencies for cultural resources within a project's APE. For purposes of complying with Section 106 of the NHPA, a Federal agency will make a determination of the APE for the project or undertaking. The APE is defined as "the geographic areas or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." Additionally, the APE "is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

The APE for an undertaking may extend beyond the physical impacts associated with a project. Depending on the scale and nature of the undertaking, and the known and anticipated types of cultural resources, the direct or indirect effects may include physical modification, intrusion to the visual or esthetic characteristics of landscapes or features, or even access to a historic property.

After a cultural resource has been determined eligible for listing in the NRHP, it is regarded the same as any other property that is listed and becomes formally known as a "historic property," regardless of age. The term "historic property" refers exclusively to NRHP listed or eligible properties.

For a federal project to be in compliance with Section 106, one of the following five scenarios will occur: (1) no historic properties exist in the APE; (2) the undertaking does not have the potential to affect historic properties; (3) there are known historic properties in the APE but the undertaking will not adversely affect them; (4) known historic properties will be adversely affected by the project and a Memorandum of Agreement (MOA) or Programmatic Agreement (PA) may be executed that will guide the mitigation or resolution of adverse effects; or (5) adverse effects are not known and a PA may be executed that will guide the inventory and identification of historic properties, evaluation of potential adverse effects to historic properties, and mitigation or resolution of adverse effects. For this undertaking, the Corps has determined that in accordance with 36 CFR § 800.5 (b) *Finding of no adverse effect*, the construction of the spillway tainter gate modification and combination earthen raise/concrete floodwall would result in no adverse effects to historic properties within the APE.

SHPO Consultation

In a letter dated March 3, 2015, the Corps initiated consultation with SHPO, informing SHPO of the proposed project and asking for comments on and concurrence with the determination of the APE, and comments on the proposed efforts to identify historic properties within the APE. In an email dated March 6, 2015, SHPO responded that they would wait to comment until the Corps submitted a document that fully addresses the identification efforts and results. The cultural resources survey report documenting the identification and evaluation efforts, as well the *Finding of no adverse effect* pursuant to 36 CFR § 800.5 (b), will be sent to SHPO requesting their concurrence with the Corps' determinations. Correspondence with SHPO is included in Appendix I.

American Indian Consultation

As part of the Section 106 process, the Corps is required to identify Native American Tribes that attach cultural affiliation to historic properties that may be affected by the proposed undertaking (36 CFR Part 800.3(f)(2). As part of 36 CFR Part 800.4(a)(4), the Corps has consulted with and is presently consulting with the Wilton Rancheria, the Tsi-Akim Maidu of the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria in an effort to identify sites of religious and cultural significance that may be affected by the proposed undertaking. A detailed consultation log is included in Appendix I. If historic properties are identified during this consultation process, and if the proposed undertaking results in adverse effects to the identified historic properties, then the Corps will work with appropriate Native American Tribes and SHPO to mitigate adverse effects to those resources.

Compliance with Section 106

In accordance with 36 CFR § 800, the implementing regulations of Section 106 of NHPA, the Corps has determined that the project will result in no adverse effects to historic properties. The Corps has consulted with interested parties, SHPO, and Native American tribes and individuals in the Section 106 compliance process. The Corps will submit the finding of no adverse effects to historic properties to SHPO for concurrence, after which the Corps will be in compliance with Section 106.

Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 et seq.)

Full compliance. In the unlikely event that human remains are encountered, all activities in the vicinity of the discovery will cease immediately and a Reclamation official will be contacted immediately. The Reclamation official will ensure the appropriate officials are contacted, including contacting Reclamation's Regional Law Enforcement Officer. If the remains are skeletal, the Reclamation official will immediately notify Reclamation's Regional

Archaeologist. Information regarding the discovery, including contents and location, will be kept confidential and relayed only to responsible officials. Human remains will be treated with respect, will not be disturbed, and must be protected as necessary to lessen further exposure or impacts. Photographs will not be taken and no postings on social media is permitted. Ongoing activities in the vicinity of the discovery will not proceed until Reclamation provides authorization to proceed.

Reclamation will be responsible for identification of skeletal human remains as Native American. Inadvertent and unpermitted discoveries of Native American human remains and Native American funerary objects, sacred objects, and objects of cultural patrimony discovered on Federal land are subject to the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. 3001 et seq.) and the implementing regulations at 43 CFR Part 10. Reclamation is responsible for compliance with NAGPRA and for conducting tribal consultations. Under NAGPRA, the discovery and location of human remains is confidential and will not be shared with anyone, especially the press or social media, who is not a designated official.

5.2 State of California Laws, Regulations, and Policies

Alquist-Priolo Earthquake Fault Zoning Act

Full compliance. The Alquist-Priolo Earthquake Fault Zoning Act (California PRC Sections 2621-2630 was passed by the California Legislature in 1972 to mitigate the hazard of surface faulting to structures. The Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface tract of active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults. The Folsom Dam Raise Project does not contain any Alquist-Priolo Earthquake Fault Zones.

Assembly Bill 52

In September of 2014, the California Legislature passed Assembly Bill (AB) 52, which added provisions to the Public Resources Code regarding the evaluation of impacts on tribal cultural resources under CEQA, and consultation requirements with California Native American tribes. In particular, AB 52 now requires lead agencies to analyze project impacts on "tribal cultural resources," separately from archaeological resources (PRC § 21074; 21083.09). The Bill defines "tribal cultural resources" in a new section of the PRC Section 21074. AB 52 also requires lead agencies to engage in additional consultation procedures with respect to California Native American tribes (PRC § 21080.3.1, 21080.3.2, 21082.3). Finally, AB 52 requires the

Office of Planning and Research to update Appendix G of the CEQA Guidelines by July 1, 2016 to provide sample questions regarding impacts to tribal cultural resources (PRC § 21083.09). No tribal cultural resources have been identified within the Folsom Dam Raise Project.

Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations

Full Compliance. As required by the California EPA Air Resources Board, Section 93105 Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations requires compliance on any work done in any portion in a geographic ultramafic rock unit, any portion of the area to be disturbed has naturally-occurring asbestos, serpentine, or ultramafic rock as determined by the owner / operator, or the Air Pollution Control Officer (APCO); or naturally-occurring asbestos, serpentine, or ultramafic rock is discovered by the owner / operator, a registered geologist, or the APCO in the area to be disturbed after the start of any construction, grading, quarrying, or surface mining operation. The Folsom Dam Project would be in compliance with the implementation of dust control best management practices, as defined by Section 93105 (CARB 2016).

California Clean Air Act

Partial Compliance. The California Clean Air Act was signed into law in 1988 and, for the first time, clearly spelled out in statute California's air quality goals, planning mechanisms, regulatory strategies, and standards of progress. The California Clean Air Act provides the State with comprehensive framework for air quality planning regulation. Prior to passage of the Act, Federal law contained the only comprehensive planning framework.

The California Clean Air Act requires attainment of state ambient air quality standards by the earliest practicable date. For air districts in violation of the state ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide standards, attainment plans were required by July 1991. CARB is responsible for the development, implementation, and enforcement of California's motor vehicle pollution control program, GHG statewide emission estimates and goals, and development and enforcement of GHG emission reduction rules. A summary of the major California GHG regulations that would affect the project's GHG emissions are presented in Section 3.7. Section 202(a) of the California Clean Air Act requires projects to determine whether emission sources and emission levels significantly affect air quality based on Federal standards established by the USEPA and State standards set by CARB. Compliance with the California Clean Air Act for GHG emissions is expected with incorporated mitigation specified in section 3.7. As a result, full compliance with this Act is expected with coordination with SMAQMD and preconstruction permitting.

California Endangered Species Act

Partial Compliance. This Act requires the non-Federal partner to consider the potential adverse effects to State-listed species. As a joint NEPA/CEQA document, this DSEIS/SEIR has considered the potential effects to State-listed species, as discussed in Section 3.5. There is the potential for the Folsom Dam Raise Project to impact the state-listed bald eagle and Swainson's hawk, but only if nests are present at the construction sites. The Corps has been coordinating with CDFW regarding potential impacts to State-listed species. Prior to construction of any site, the Corps and the State would conduct preconstruction surveys to determine the presence of nests at construction sites. If nests are present, coordination with CDFW would occur to determine any mitigation or minimization measures that would need to be implemented. The project would be in full compliance with this Act once these surveys are conducted and coordination has occurred.

California Environmental Quality Act

Partial Compliance. CEQA requires that State and local agencies identify the significant environmental impacts of their actions, and avoid or mitigate those impacts when feasible. The CEQA amendments of December 30, 2009 specifically require lead agencies to address GHG emissions in determining the significance of environmental effects caused by a project, and to consider feasible means to mitigate the significant effects of GHG emissions (California Natural Resources Agency 2012). The CVFPB, as the non-Federal partner, would undertake activities to ensure compliance with the requirements of this Act. CEQA requires the full disclosure of environmental effects, potential mitigation, and environmental compliance for the proposed project. The CVFPB would consider certifying the final EIR and adopting its findings. Certification of the final EIR by the CVFPB would provide full compliance with CEQA.

California Seismic Hazards Mapping Act

Full Compliance. The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code [PRC] Sections 2690-2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites, and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils. The project area is within the Foothills Fault System, which is located in the metamorphic belt. No active faults have been mapped within the project area by the California Geological Survey or U.S. Geological Survey. The closest fault is a Quaternary (younger than 1,600,000 years) is just over 8 miles to the northwest. As a result, there would be no significant effects on the project due to seismicity and the Folsom Dam Raise Project is in full compliance with this Act.

California Water Code

Partial Compliance. The Folsom Dam Raise Project is located within the jurisdiction of the Central Valley RWQCB, within the greater Sacramento Valley watershed. The preparation and adoptions of water quality control plans, or Basin Plans, and statewide plans, is the responsibility of the SWRCB according to State law and requires that Basin Plans conform to the policies set forth in the California Water Code beginning with Section 13000 and any State policy for water quality control. These plans are required by the California Water Code (Section 13240) and supported by the Federal CWA. Section 303 of the CWA requires states to adopt water quality standards which “consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses.” According to Section 13050 of the California Water Code, Basins Plans consist of a designation or establishment for the waters within a specific area of beneficial uses to be protected and water quality objectives to protect those uses. Adherence to Basin Plan water quality objectives protects continued beneficial uses of water bodies. Because beneficial uses, together with their corresponding water quality objectives, can be defined per Federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the State and Federal requirements for water quality control (40 CFR 131.20). The potential effects of the proposed project on water quality have been evaluated and are discussed in Section 3.11. Compliance with the California Water Code would be accomplished by obtaining certifications from the Central Valley RWQCB for Section 401 and, if applicable, Section 404 review internally by the Corps.

Porter-Cologne Water Quality Control Act

Partial Compliance. The Porter-Cologne Water Quality Control Act of 1970 established the SWRCB and RWQCBs within the State of California. These groups are the primary state agencies responsible for protecting California water quality to meet present and future beneficial uses, and regulate appropriative surface rights allocations. The preparation and adoption of water quality control plans, or Basin Plans, and statewide plans, is the responsibility of the SWRCB. State law requires that Basin Plans conform to the policies set forth in the California Water Code beginning with Section 13000 and any State policy for water quality control. These plans are required by the California Water Code (Section 13240) and supported by the Federal CWA. Section 303 of the CWA requires states to adopt water quality standards which “consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses.” According to Section 13050 of the California Water Code, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected, and adherence to water quality objectives to protect those uses. The potential effects of the proposed project on water quality have been evaluated and are discussed in Section 3.11. This project expects to achieve full compliance with the Water Quality Control Act by achieving compliance with RWQCB certification mandates for Section 401 of the Federal CWA.

California Streets and Highways Code

The California Streets and Highways Code authorize the California Department of Transportation (Caltrans) to control encroachment within the State highway right-of-way. Encroachments allow temporary or permanent use of a highway right-of-way by a utility, a public entity, or a private party.

CHAPTER 6.0 - COORDINATION AND REVIEW OF DRAFT EIS/EIR

This chapter summarizes public and agency involvement activities undertaken by the Corps, CVFPB, and SAFCA that have been conducted to date, are ongoing, and/or would be conducted for this project, and which satisfy NEPA and CEQA requirements for public scoping and agency consultation and coordination. Additionally, Native American consultation activities are described.

6.1 Public Involvement Under NEPA and CEQA

The lead agencies are implementing a comprehensive public participation program to fully inform and engage potentially affected agencies, stakeholders, and communities. This section describes public involvement to date and future steps to be taken with the public.

6.2 Public Interest

Two public scoping meetings with identical formats and materials for the Folsom Dam Raise Project were held from 5:00 p.m. to 7:00 p.m. on Wednesday, February 19, 2014 at the Folsom Community Center, and on Monday, February 24, 2014 at the Sacramento Library Galleria. The meetings were advertised in February 2014 in the Sacramento Bee and the Folsom Telegraph. Mail and e-mail announcements were also sent to stakeholders and other interested parties. In addition, a Notice of Intent was filed with the Federal Register on February 6, 2014.

When the draft SEIS/SEIR is completed, it will be released and a public meeting scheduled during the public review period.

6.3 Native American Consultation

As part of the Section 106 process, the Corps is required to identify Native American Tribes that attach cultural affiliation to historic properties that may be affected by the proposed undertaking (36 CFR Part 800.3(f)(2). As part of the 36 CFR Part 800.4(a)(4), the Corps has consulted with and is presently consulting with the Wilton Rancheria, the Tsi-Akim Maidu of the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria in an effort to identify sites of religious and cultural significance in the APE that may be affected by the proposed undertaking. A detailed consultation log is included in Appendix I. If historic properties are identified during this consultation process, and if the proposed undertaking results in adverse effects to the identified historic properties, then the Corps will work with appropriate Native American Tribes and SHPO to mitigate adverse effects to those resources.

The provisions of AB 52 only apply to projects that have a notice of preparation filed on or after July 1, 2015, and therefore the Bill's requirements are not applicable to the proposed Project (the NOP was filed February 17 2014 SCH# 2006022091). Although AB 52 requirements were not in place at the time of the NOP, Tribal coordination noted above and documented in Appendix I, occurred and is substantially consistent with the intent of AB52 for this project.

6.4 Consultation with Other Federal, State, and Local Agencies

A complete list of Agencies is located in Appendix J.

6.5 List of Recipients

A complete list of recipients is located in Appendix J.

6.5.1 Elected Officials and Representatives

A complete list of recipients is located in Appendix J.

6.5.2 Government Departments and Agencies

U.S. Government Agencies

- Council on Environmental Quality
- Federal Emergency Management Agency
- U.S. Bureau of Reclamation
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- Western Area Power Administration

State of California Agencies

- Assembly Committee on Water, Parks, and Wildlife
- California Air Resources Board

- California Department of Conservation
- California Department of Corrections and Rehabilitation
- California Department of Fish and Wildlife
- California Department of Parks and Recreation
- California Department of Water Resources
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Governor’s Office of an Emergency Services
- Native American Heritage Commission
- Senate Committee on Natural Resources
- State Clearinghouse
- State Lands Commission
- State Office of Historic Preservation
- State Water Resources Control Board

Regional, County, and City Agencies

- City of Folsom
- El Dorado County
- Placer County
- Sacramento Area Flood Control Agency
- Sacramento County
- Sacramento Metropolitan Air Quality Management District

CHAPTER 7.0 - LIST OF PREPARERS

U.S. Army Corps of Engineers

- Lisa Aley, Environmental Manager
- Mariah Brumbaugh, Senior Environmental Manager
- Kristine Des Champs, Civil Engineer
- Katie Charan, Senior Project Manager
- Brian Luke, Senior Environmental Manger
- Melissa Montag, Historian
- Jane Rinck, Cultural, Recreation, Social Assessment Section Chief
- Sara Ross Arrouzet, Senior Environmental Manager

California Department of Water Resources

- Vincent Heim, Environmental Scientist
- Cory Koger, Senior Environmental Scientist (Supervisor)
- Erin Brehmer, Environmental Scientist

Central Valley Flood Protection Board, CA Department of Water Resources

- Ruth Darling, Senior Environmental Scientist (Specialist)

CHAPTER 8.0 - REFERENCES

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